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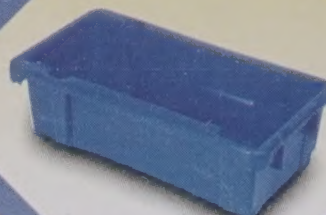
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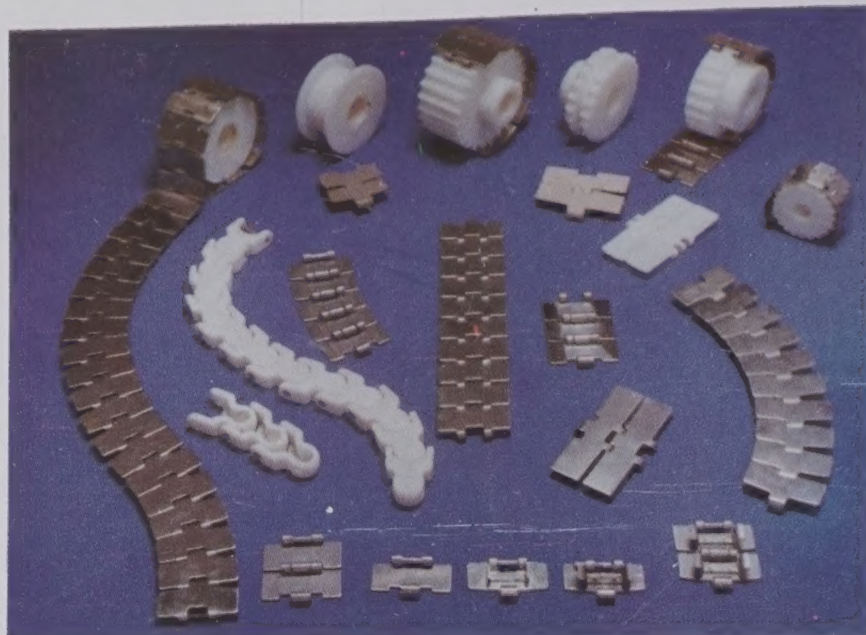
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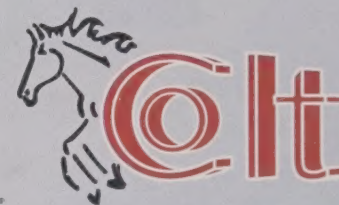


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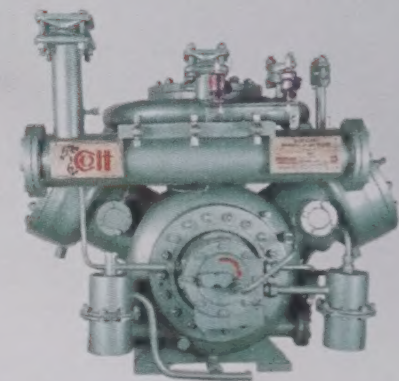


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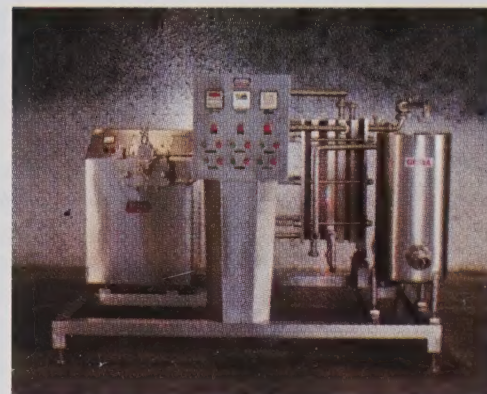
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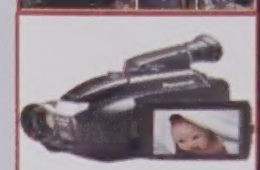
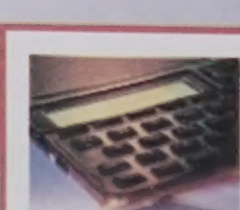
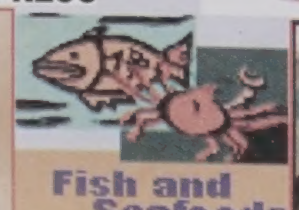
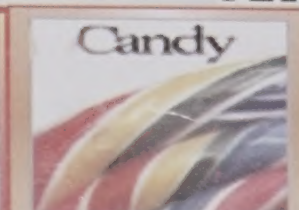
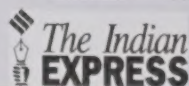
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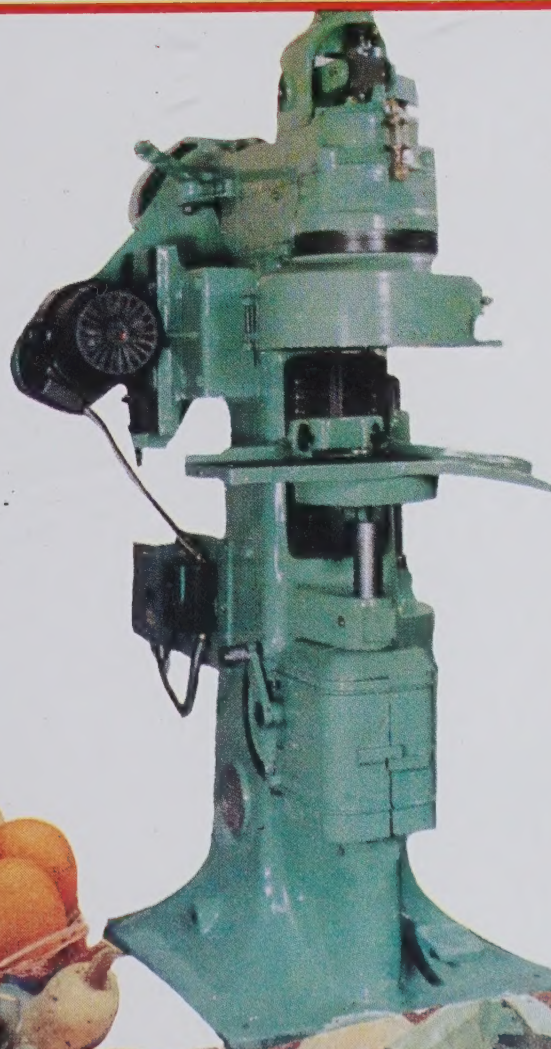
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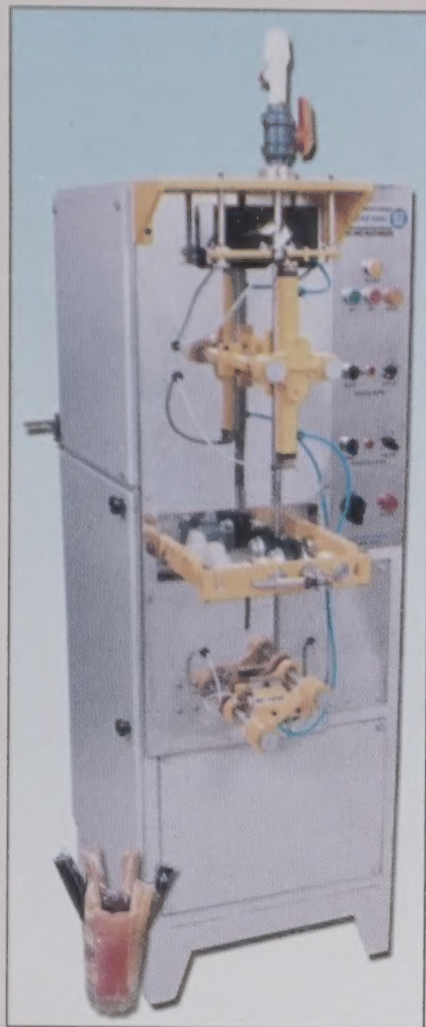
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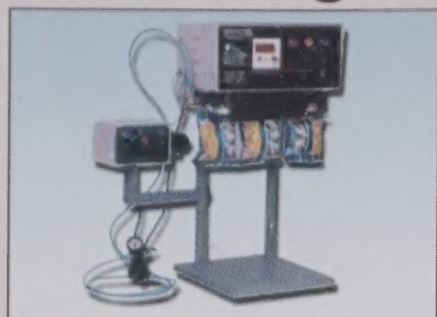
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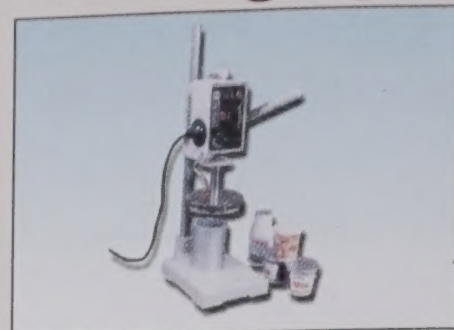
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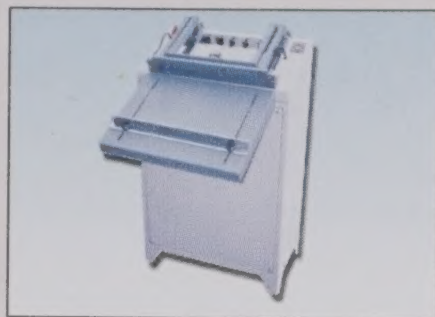
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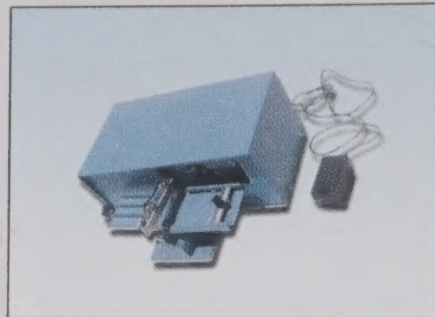
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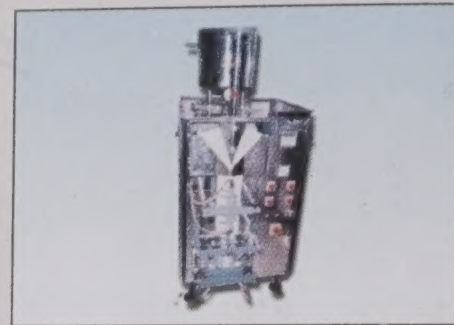
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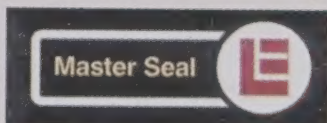
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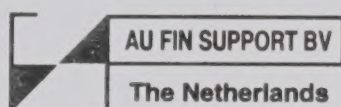


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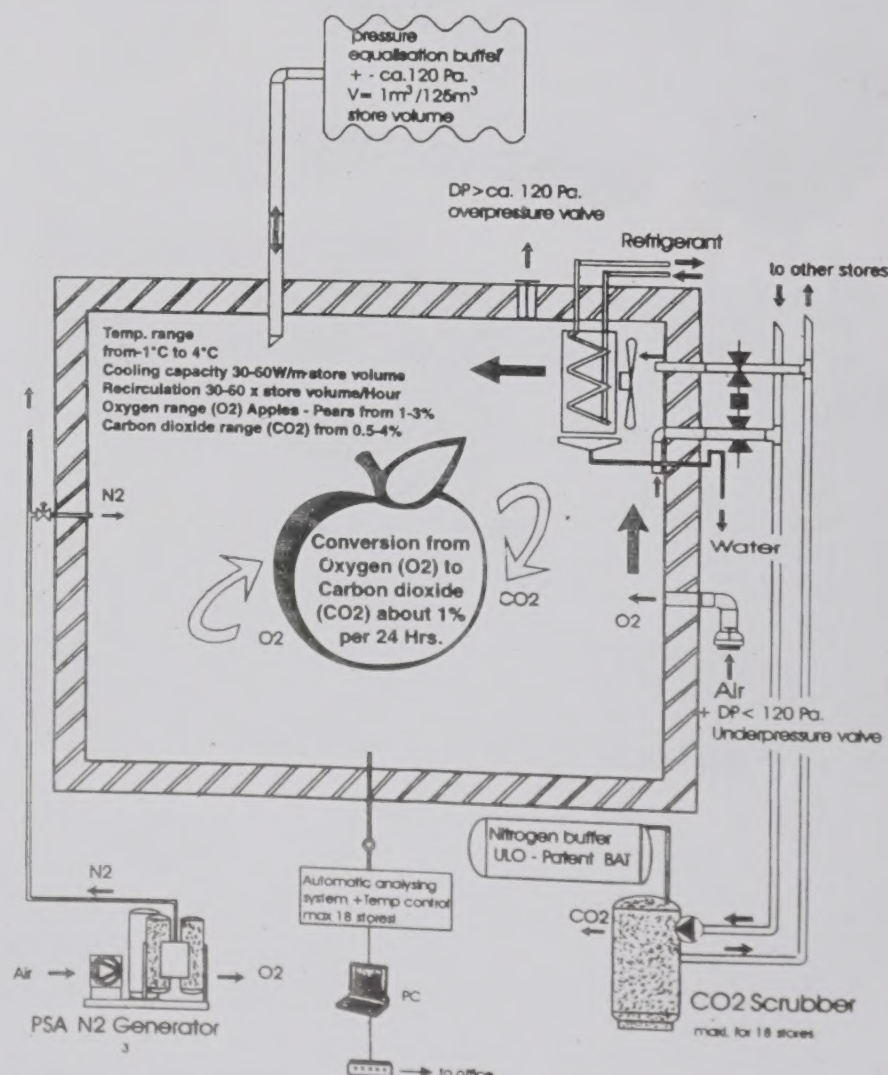
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Cold Room Ozonation- A Boon to the Industry

By.
V.Baratharaj

Today 90% of all cold storages in the US are ozonated. Ozone usage has helped reduce wastage, helped preservation during transportation & increased shelf-life. The use of ozone in cold storages has been the best thing that has happened to this industry this century.

Brief Introduction to Ozone :

Ozone is a strong oxidizing agent that is also known as super charged oxygen by virtue of its strong Oxidizing power (3000 times more than chlorine) , it is found very useful in numerous applications such as water treatment, swimming pool water treatment, cooling tower water treatment, etc. The use of ozone is considered very safe especially in comparison with the use of chlorine which is very harmful due to its side effects. Ozone is a very powerful agent that kills bacteria, viruses, cysts, amoebae etc., more predictably than chlorine or UV lamps.

Ozone being a gas, has various properties that other commonly used oxidizing agents do not have; namely decolorizing, deodorizing and flocculating properties and above all its penetrating effects that is used in the preservation industry.

Ozone in Preservation and Storage

Here, reference will be made to the possibility for the quick and efficient destruction in an ozone atmosphere of various non-pathogenic micro-organisms including molds, spores and other primitive single cell creatures. The wide ranging possibilities for using ozone in the food industry and agriculture as well as in other fields, are created similarly by it's bacterial and germ killing power. Not only does it act as a germicide but as a spore killing agent as well. Fruits, food-stuffs, etc., exposed to its effect, undergo a more or less pronounced change as a consequence of it's action on the vital process of cells, the process of their metabolism particularly, through the inactivation of their metabolic products. At the same time it reacts with other materials present that can be oxidized and thereby it destroys fragrances and odors.

Utilization of these properties makes ozone eminently suitable for increasing the storage life of perishable foods in refrigerated premises. At the same time it's use is economic as the investment and operational costs of the equipments are on a acceptable level in relation to the size of refrigerated rooms. It's application eliminates the risk of leaving the unpleasant odor or other traces of antiseptics used for preservation on food stuffs.

Utilization of ozone for increasing the storage life of food, particularly if held at low temperatures, is believed to have started in 1909 when, in a cold storage plant of Cologne, a reduction in the germ count on the surface of meat stored there was observed after an ozone generator had been installed in the duct of fresh air used to ventilate the storage room.

Practical operations for preservation starts with the sterilization of air in such a way that the air entering the storage room contains a sufficient amount of ozone to destroy micro-organisms. At the same time, however, ozone decomposition to a significant extent is to be expected due to the high moisture content required for its effectiveness. Loss of ozone due to moisture on the walls of the storage room, the packaging materials, the absorption effect of the stored

goods, and also to the oxidation reactions taking place has to be taken into account.

These reasons demand the most perfect distribution of ozonized air in the storage room and make it imperative that the capacity of the ozone generator ensures the maintenance of the appropriate ozone concentration throughout the whole mass of air. This application is needed during storage. Ozone exerts a threefold effect by destroying the micro-organisms, oxidizing the odors and effecting the processes of metabolism.

Germicidal Effects

For applications in the food industry, a greater emphasis should understandably be put on the changes in quality taking place following the ozone treatment, along with the specific effects exerted on individual products. The germicidal power of ozone is generally specific in respect of individual species.

It's primary action on molds is to suppress their growth and this effect can set in rapidly, particularly in the initial stage on a mold free surface. Afterwards this process leads to the destruction of cultures already formed. Ozone attacks immediately the easily accessible cells on the surface since ozone exerts a surface effect in the first place and has a only slight depth of penetration.

Kolodyaznaya and Sponina investigated the micro flora causing the deterioration of the potato. Pure mold cultures of

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Fusarium Solani, *Rhizoctonia Solani*, and *Phytophthora Solani* were exposed to the action of ozone. From these species *Fusarium Solani* proved to be resistant to ozone. Ozonation applied for the storage of refrigerated meat destroys surface micro-organisms, particularly the family of *Pseudomonas* responsible for spoilage.

Increasing the moisture content of the environment favourably influences the germicidal effect. This is brought about by the swelling of microbes making them more susceptible to destruction. Experiments conducted with beef showed that ozone is most efficient if the surface has a definite moisture content of around 60%.

Effects on Odors

Ozone itself has a characteristic odor, yet the result of application does not mask all odors. Atomic oxygen formed by decomposition of ozone immediately oxidizes the different smelling materials.

However, the characteristic putrid odor, remains and is difficult to eliminate even with the use of ozone. In general, the lower the temperature and the larger the molecules taking part in the reaction, the weaker is the oxidizing effect. The moisture content in the air has no effect on the process. At very slight concentration, say between 0.01 and 0.04 p.p.m. ozone, the air of the room of storage space is felt to be fresh and pleasant and no stuffy odor is sensed any more.

It is an established fact that the odor of aromatic fruits such as strawberries is enhanced in the presence of ozone. It is possible that the formation of fragrances and odors giving the fruit its characteristic flavor is assisted by ozone. The sterilization of the air in fruit stores by ozone prevents the odors of packaging materials from being transferred to the goods stored, a phenomena which frequently takes place otherwise, particularly when wooden crates are used in refrigerated stores at relative humidity of 85% to 90%.

Effect on Metabolism

The effect on metabolism is also a consequence of the strong oxidizing power of ozone. No deterioration of fruit was observed, but the reason for this is that ozone only affects the surface of fruit which contain compounds difficult to oxidize in most cases. During storage the process of respiration of fruit is speeded up and so is ripening. In the case of a more rapid ripening than would be desirable, ethylene is produced which affects the other fruits and so initiates even more intensive ripening. The external signs of this process are the browning of the skin of the fruit, the softening of the flesh of the rest of the fruit and finally, decay. This process is controlled by the presence of ozone because it oxidizes the metabolic products created initially, reducing thereby the process of back action on other fruits. Moreover, it promotes the healing of wounds and enhances resistance to further infection.

Meat

For the storage of meat it was found that a satisfactory effect can be brought about by one or two periods daily of ozone application, lasting two hours each time if the ozone content was held at 6 mg. (0)m. (air). Application of ozone proved to be particularly beneficial to the process of tenderizing meats. During tenderizing, fresh beef sides are kept for 42 to 44 hours in a closed space at a temperature of 293K and a relative humidity of 85%. The process of tenderization consists, in actual fact, of the digestive action caused by enzymes naturally present to soften and slacken muscles and connective tissue.

The same process can take as much as 20 days at a temperature of 279K. The accelerating effect of temperature increases tenderisation, promotes the formation of fertile soil

suitable for the multiplication of infectious bacteria and spores of deleterious nature.

The aim to be achieved with ozone treatment is the destruction of these harmful surface organisms. In such a tenderizing room a concentration of 0.1 p.p.m. and a relative humidity of 60% to 90% should be maintained. According to others, ozone is efficient, even if present in a concentration of 0.04 p.p.m. and, although it fails to bring about full sterilization, it still retards the growth of bacteria. The germicidal action of ozone is restricted only to the surface in the case of meat too, and has a small depth of penetration. Molds present in the form of spores can be destroyed only if attacked by a high concentration of ozone. The storage life of beef in a refrigerated state can be increased by 30% to 40% if the beef is kept in a atmosphere of 10 to 20 mg. (0) m (air) and the microbial saturation of its surface is not greater than 10 bacteria cm. Billion conducted a detailed investigation on the storage life of beef, veal, lamb, pork, chicken, and rabbit in ozonized atmospheres. In the case of the varieties of meat stored in a normal atmosphere, it was found that significant microbial contamination sets in after 7 days. Contamination's of the same level were reached on meats exposed to the action of ozone only after 14 days under identical conditions.

It can be stated in general that, in a refrigerated atmosphere and in the presence of ozone, the growth of the surface micro flora (*Pseudomonas families*, *spores*, *salmonellae*, *staphylococci*) is slowed down. Nevertheless, no effect is exerted by ozone on the surface micro flora if the extent of contamination is large already. Thus, although ozone fails to produce an express antiseptic effect on stored meats, it still makes the atmosphere of refrigerated stores fresh and healthy.

Freshly caught fish can be stored longer if washed in water containing ozone. If it is preserved by ice produced from ozone containing water a higher increase in damage-free storage time can be obtained.

Cheese

Experiments for the use of ozone during the process of ripening and storage of cheese were successfully conducted. Spores created on the surfaces of cheese during the ripening period were destroyed and storage life was increased to 11 weeks by the application of a small ozone concentration (0.02 p.p.m.) at 288K and a relative humidity of 80% to 85%. Experiments were conducted on cheddar cheese indicating that odors otherwise present in storage rooms were also eliminated by the oxidizing action of ozone.

Eggs

Ozone has been successfully used for the storage of eggs. By the end of the 1930s, more than 80% of refrigerated egg stores in the United States were equipped with ozone generating equipment to increase storage life.

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Recent Trends in Multi-Purpose Cold Storage Practice

by
Arvind Surange

India ranks among the topmost producers of fruits and vegetables in the world. The estimated fruit production is around 40 million M.T. and the vegetables production is around 80 million M.T. However, the present estimated capacity of cold stores is just around 10 million M.T. including all varieties of cold stores. The non-availability of adequate storage facility results in tremendous wastage of the commodities with an estimated loss of over Rs. 20,000 Crores annually.

The current scenario indicates that around 35% of the cold stores in India are designed for storage of potatoes and around 10% of the capacity are used for multi-purpose storage application including fruits and vegetables.

There are many kinds of vegetables and fruits and food products which can be stored in cold stores for periods ranging from two weeks to over eight months. The information on the storage temperature, storage life and the post cold storage periods of some fruits, vegetables etc. is given in Table-1.

The awareness regarding the importance of cold storage for a wide range of agricultural and other produce has considerably increased in the past two decades in India. Cold stores form the most important element in the cold chain which is so vital for proper storage and distribution of a wide variety of fruits, vegetables, spices, dry fruits, milk products, fish, meat and poultry and dairy products etc. With fast changing life styles and also food habits the need for the cold storage capacity for a variety of items is increasing and more commodities are being added to the list of cold storage items over the years.

The present day cold stores can be classified as follows:

1. Bulk Cold Stores - Generally, for storage of a single commodity which mostly operates on a seasonal basis e.g. stores for potatoes, chillies, apples etc.
2. Multi-purpose Cold Stores designed for storage of variety of commodities which operate practically, round the year.
3. Small cold stores with precooling facilities for fresh fruits and vegetables, mainly, for export oriented items like Grapes etc.
4. Frozen food stores with or without processing and freezing facilities for fish, meat, poultry, dairy products and processed fruits and vegetables.
5. Mini units/Walk-in cold stores located at distribution centres etc.

Cold Storage Data for various Fruits, Vegetables etc.

Vegetables Commodity	Optimal storage Temp. C.	Optimal relative Humidity %	Approx. Storage Life
Beans :			
Dried	10	70	6 to 8 Months
Beefs :			
Roots	0	95 to 100	4 to 6 Months
Bunch	0	98 to 100	10 to 14 days
Broccoli	0	95 to 100	10 to 14 days
Cabbage, late	0	98 to 100	5 to 6 Months
Carrots :			
Topped-immature	0	98 to 100	4 to 6 Weeks
Topped-mature	0	98 to 100	7 to 9 Months
Cauliflower	0	98 to 98	3 to 4 Weeks
Corn, Sweet Days	0	95 to 98	4 to 8
Cucumber	7 to 13	95	10 to 14 days
Garlic, dry	0	65 to 70	6 to 7 Months
Onions :			
Green	0	95 to 100	3 to 4 Weeks
Dry & Onion Sets	0	65 to 75	1 to 8 Months
Peas :			
Green	0	95 to 98	1 to 2 Weeks
Dried	10	70	6 to 8 Months
Peppers :			
Dried	0 to 10	60 to 70	6 Months
Sweet	7 to 13	90 to 95	2 to 3 Weeks
Potatoes :			
Early	3 to 4	90 to 95	4 to 5 Months
Main Crop	3 to 4	90 to 95	5 to 8 Months
Sweet	10 to 13	85 to 90	4 to 7 Months
Pumpkins	10 to 13	50 to 75	2 to 3 Months
Redishes :			
Spring	0	95 to 100	3 to 4 Weeks
Winter	0	95 to 100	2 to 4 Weeks
Rhubarb	0	95 to 100	2 to 4 Weeks
Tomatoes :			
Mature Green	13 to 16	90 to 95	1 to 3 Weeks
Firm, Ripe	7 to 10	90 to 95	4 to 7 days
Fruits and Melons			
Apples	0 to 3	90 to 95	3 to 8 Months
Apricots	0 to 1	90 to 95	1 to 3 Weeks
Bananas	13 to 14	85 to 95	
Cheeries :			
Sour	0	90 to 95	3 to 7 days
Sweet	-1 to 0.5	90 to 95	2 to 3 Weeks
Coconut	0 to 1	90 to 95	3 to 5 Months
Dates, cured	-18 or 0	75 or less	6 to 12 Months
Figs :			
Dried	0 to 4	50 to 60	9 to 12 Months
Fresh	-1 to 0	85 to 90	7 to 10 days
Grapes :			
American	-1 to 0	85 to 90	2 to 8 Weeks
Vinifera	-1 to 0	90 to 95	3 to 6 Months
Guavas	5 to 10	90	2 to 3 Weeks
Lemons	11 to 12	85 to 90	1 to 4 Months
Limes	8 to 9	85 to 90	6 to 8 Weeks
Lychees	1 to 2	90 to 95	3 to 5 Weeks
Mangoes	10 to 13	85 to 90	2 to 3 Weeks
Oranges, FL & TX	0 to 1	85 to 90	8 to 12 Weeks
Papayas	7	85 to 90	1 to 3 Weeks
Peaches	-0.5 to 0	90 to 95	2 to 4 Weeks
Peaches, dried	0 to 5	55 to 60	5 to 8 Months
Pears	-1.6 to -0.5	90 to 95	2 to 7 Months
Pineapples, ripe	7	85 to 90	2 to 4 Weeks
Plums	-1 to 0	90 to 95	2 to 3 Weeks
Pomegranates	4	90 to 95	2 to 3 Months
Raisins :			
Black	-0.5 to 0	90 to 95	2 to 3 days
Red	-0.5 to 0	90 to 95	2 to 3 days
Strawberries	-0.5 to 0	90 to 95	5 to 7 days
Watermelons	4 to 10	90	2 to 3 Weeks

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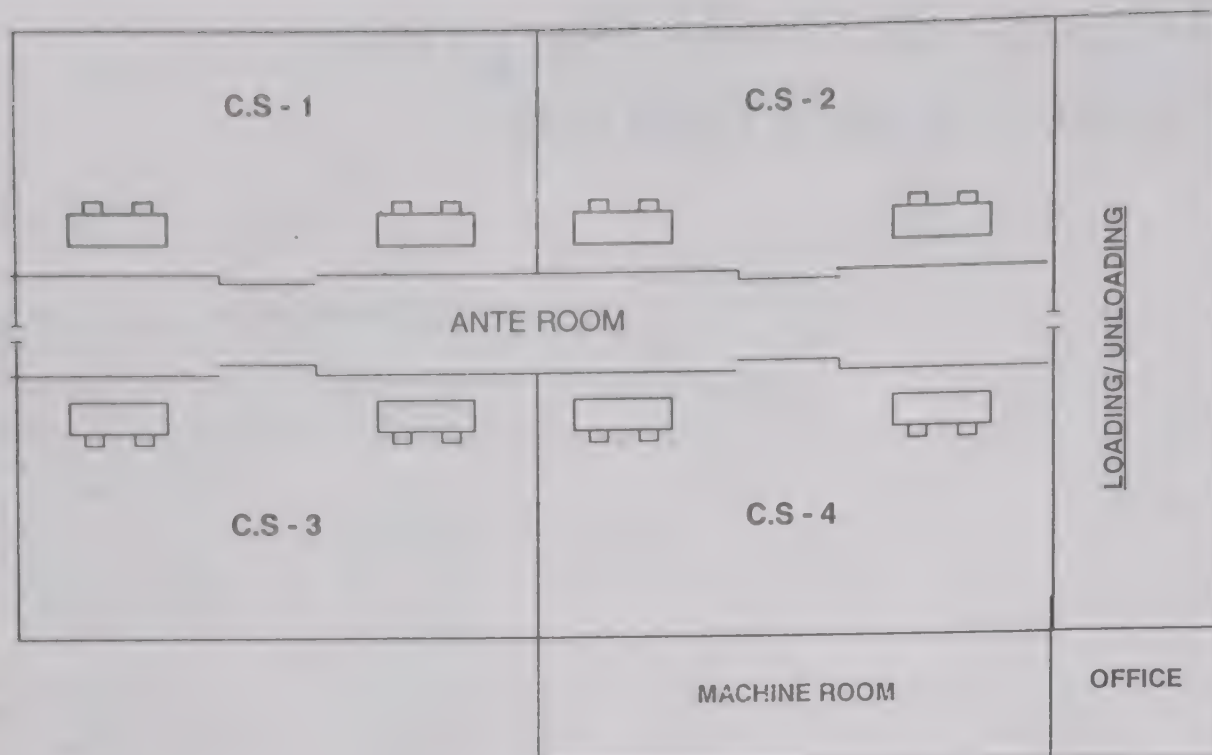


FIG. -1 PLAN
TYPICAL MULTI FLOOR - MULTI PURPOSE COLD STORAGE
WITH CLG. MOUNTED A.C. UNITS

6 Controlled Atmosphere (CA) Stores for certain fruits/vegetables.

Construction Practices

Whereas the bulk cold stores have fewer number of large sized chambers, the multi-purpose units have a larger number of smaller chambers designed for simultaneous storage of a variety of items to suit the needs of the farmers, traders and other customers.

Refrigeration System

The section of Refrigeration Systems for multipurpose cold storage application can be made from a variety of systems

1. Central plants using HFC/HCFC refrigerants with air cooled/water-cooled machines.
2. Central Plants using ammonia refrigerant.
3. Modular units using HFC/HCFC refrigerants.
4. Vapour absorption system using ammonia water combination.
1. Proper cooling of products loaded in chambers to the desired temperature and maintenance of the temperature and the desired relative humidity. The daily product loading is an important factor in the cooling load estimates.
2. Proper air distribution in the cold chambers for uniform cooling and maintenance of desired conditions.
3. Systems design to achieve the best possible energy efficiency since energy bills constitute the biggest factor of running expenditure.
4. System shall have automatic/semi-automatic controls and instruments for recording storage conditions. Facility for setting the desired temperature level in the chambers, depending on the product requirements should be provided.
5. For high humidity storage requirements, provisions for external humidification or use of sprayed coil air handlers can be made.
6. The system shall be easy to maintain with easy availability of spares, refrigerant gas and services etc.

Typical Designs :

The layout of a typical multi-purpose cold storage with conventional construction in single or multi-floor arrangement is given in Fig.1. A typical cold store with insulated panel construction and modular refrigeration units, designed for mechanised loading, unloading is shown in Fig.2.

Material Handling

The flow of products to and from the cold store is an important aspect in cold storage functioning. In the conventional cold stores the loading and unloading of products is still done manually. However, in recent installation the practice is to use electrical hoists/lifts and/or forklift trucks for handling of products. These stores incorporate a rack structure in the chambers for storing the products in pallets or boxes. Arrangement for loading of pallets in containers/reefer vans is also provided in the modern cold store units. Application of computers to control the loading, unloading operations and to maintain the record of stocks is also in practice in some of the recent cold stores.

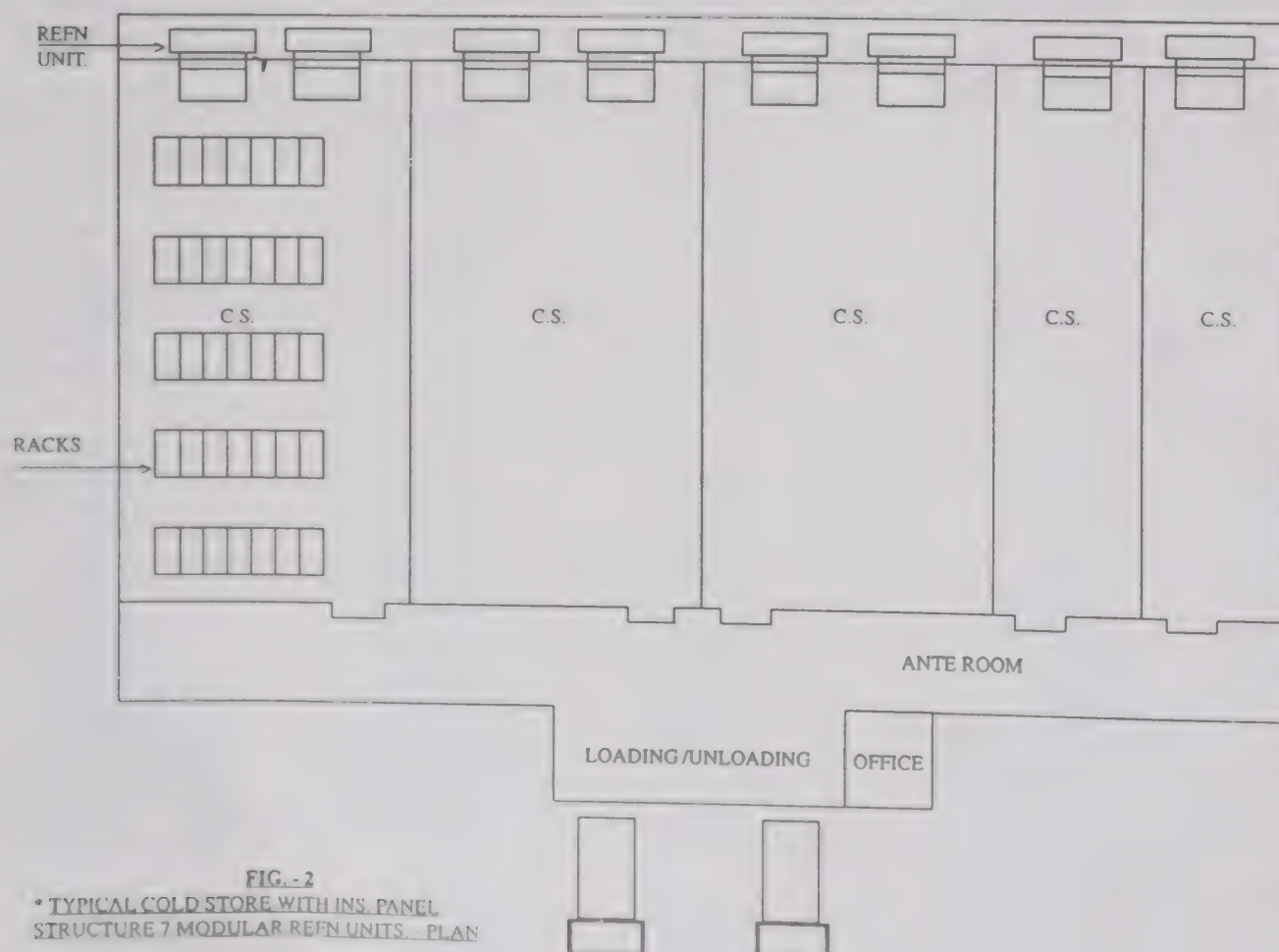


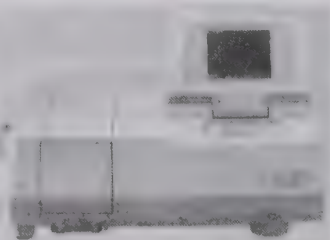
FIG. -2
* TYPICAL COLD STORE WITH INS. PANEL
STRUCTURE 7 MODULAR REFRN UNITS. - PLAN

Courtesy : M/s. Kantilal N. Shah,
C/o. Global Trade Exposition

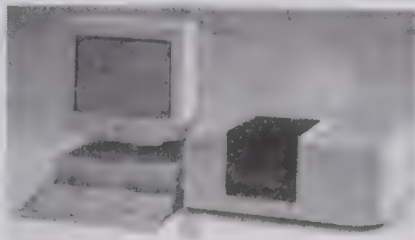
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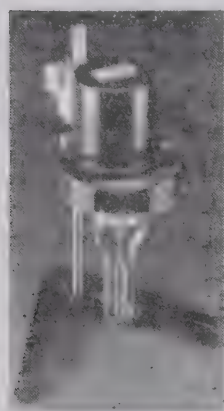
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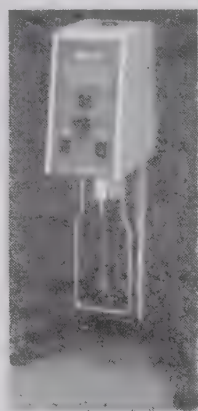
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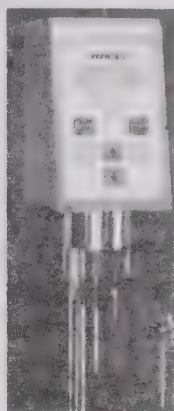
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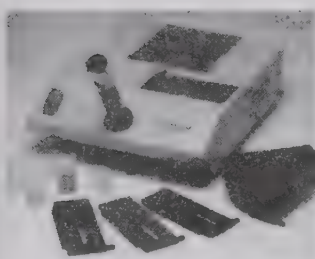
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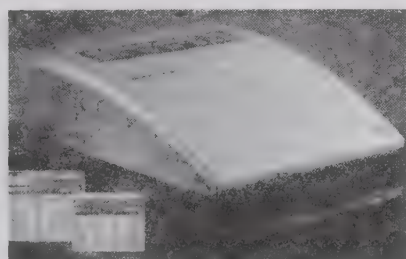
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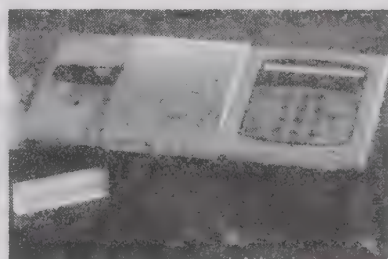
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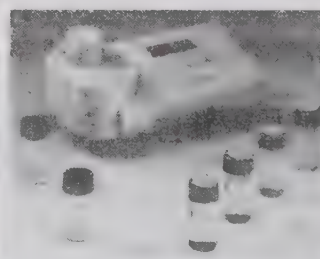
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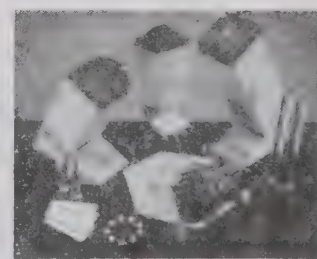
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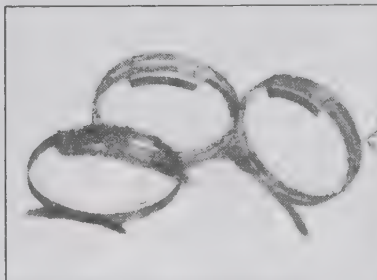
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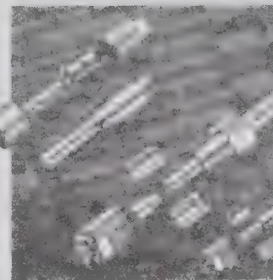
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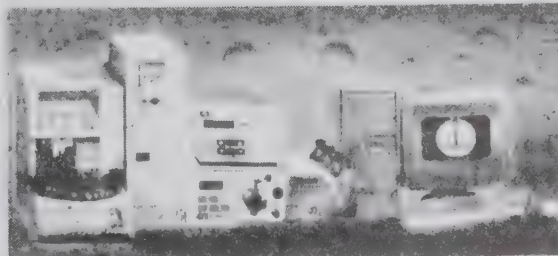


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Post Harvest Produce Conditioning for Small Agro Units

Introduction

Traditionally the fresh produce such as fruits, flowers and vegetables from small agro units was meant for local consumption only and received little or no processing. Long term preservation of some items was done by sun drying or pickling.

Today fresh produce is sent halfway around the world via fast transport and cold chains. To meet world quality and health standards, proper post harvest processing is necessary.

Post harvest Processing is needed in order to prevent or slow down.

- **DEHYDRATION DISCOLORATION and DETERIORATION** of fresh produce, and
- **LOW TEMPERATURE DRYING** for preservation of colour, taste and texture as also for processing of powders and other hygroscopic substances such as biscuits etc.

Two main tasks :

1. The produce starts losing moisture as soon as it is plucked. This is because it no longer has the osmotic pressure of the plant. The loss of this weight is also the loss in value since it is mostly sold by weight. So this weight loss must be stopped. This is done by keeping it, as quickly as possible, in cool, humid atmosphere. This also slows down its metabolism and thereby retards spoilage. Thus starts the cold chain for fresh produce.
2. For drying of high value produce, low temperature, low humidity drying preserves the colour, flavour and texture better than sun drying. The produce so dried is also free from foreign matter. Such products are much in demand and fetch good prices. Low temperature and low humidity conditions are also required for processing and blending of atta and other food powders and for keeping biscuits crisp while packing.

Costly Technology: The technology and the machinery available today for the above tasks are costly both in money and energy. They are mostly imported and require hi-tech support, which is also very costly. Small scale agro units can not afford them, so they are forced to depend on large processors.

Solution : This paper examines the problem and offers a 'deshi' solution.

The Key is to maintain a precise control over the temperature and the humidity of the air being supplied into the conditioned room.

This is like saying that you buy shares at a low price and sell them when the market goes up and you will be rich. It is easier said than done.

Let us examine why it is so difficult.

Lower The Humidity, Higher The Cost

A. Capital Cost

1. The chill-and-reheat method is

generally used for

humidity control.

2. Refrigeration Load for chilling the air is determined by adding the sensible and latent loads of the room plus the reheat.
3. Reheat is provided by steam, hot water, electricity or hot gas from the compressor.
4. Even if this energy is cheap or free, it adds to the refrigeration load, requiring higher capacity plant, adding to its cost.
5. Control of both humidity and temperature within narrow limits requires precision devices, further adding a hefty amount.
6. Thus lower the humidity, higher the capital cost of the plant.

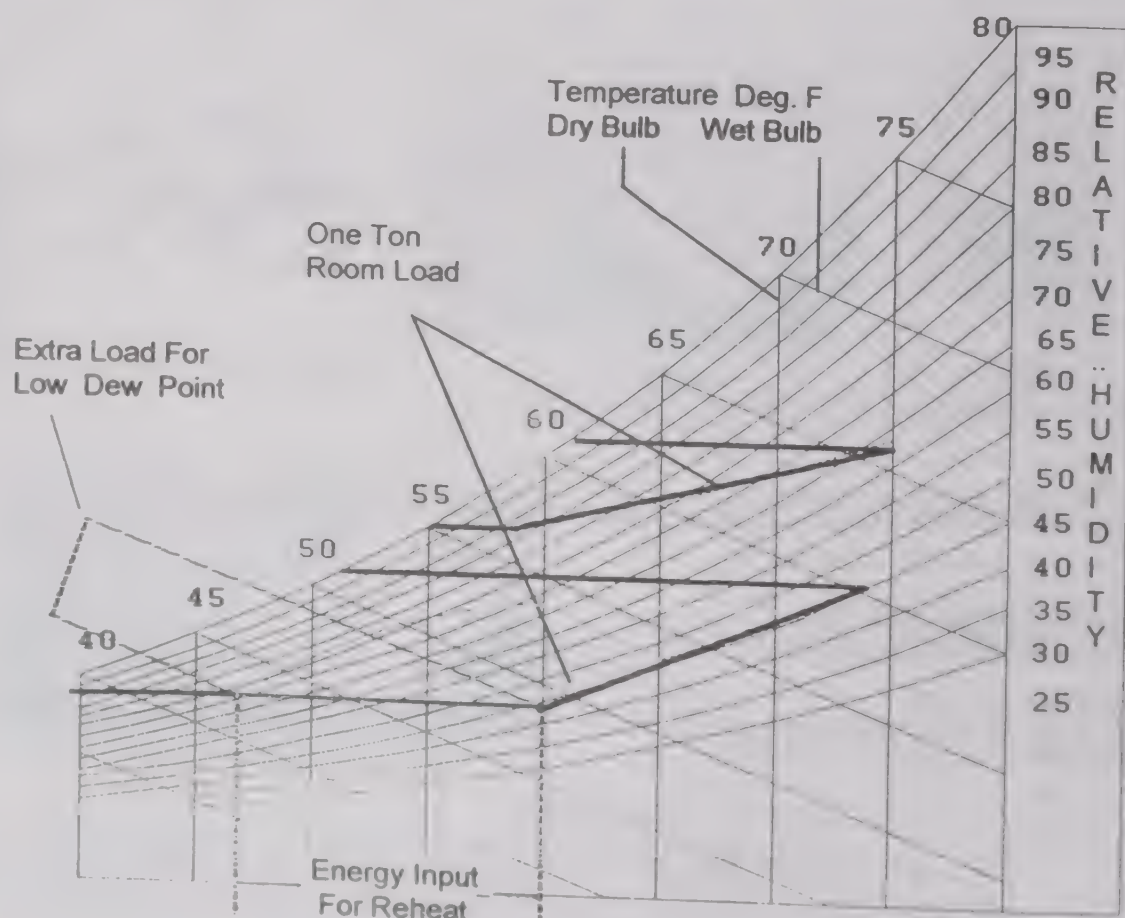
B. Energy Cost

- Lower the humidity, lower the chilled air temperature and greater the reheat energy needed.
- Total energy cost is the sum of the cost of:-
 1. The energy required to meet the normal room load.
 2. The energy for extra cooling needed to chill the air.
 3. The energy supplied to reheat the air.
 4. The energy required by the refrigeration plant to remove the injected reheat energy.
- Since the compressor has to run at a low suction pressure, the energy consumption is 20% higher.

C The Bottom Line

- Total capital cost is 50% to 100% more than a normal plant

Why A Low Humidity Plant Is Larger And Needs More Energy



- Total energy cost is 100% to 150% higher depending on the type of refrigeration plant and the cost of the reheat energy.

Why A Low Humidity Plant is Larger And Needs More Energy

1. The slope of the saturation curve decreases with temperature. So more sensible cooling is required per unit weight of water condensed. Hence more energy is consumed.
 - In the above example.
 - For comfort conditions of 75°F & 63% RH, the difference in the dew points of air entering and leaving the room is 6.4°F. Moisture condensed is 17 grains/lb.
 - For maintaining 74°F and RH at 45% for the same room load and the same airflow, the difference is 12.6°F, for condensing 22 grains/lb. A 100% increase in sensible cooling is required for removing 30% more moisture.
2. Cold air leaving the cooling coil must be reheated to the calculated grill temperature, requiring energy. This is substantial.
 - In the above example.
 - If the air flow is 400 cfm/ton, then the energy required to reheat the air from 47°F to 60°F is 5616 btu/hr, that is about 1.7 kw/ton, since the room load is one ton.
 - This also adds to the load on the compressor. It must now remove 17616 btu/hr. So for the room load of one ton, the refrigeration load is 1.5 TR.

- The compressor is less efficient at lower evaporating temperature. Its cooling capacity also decreases, so it must have higher nominal capacity, say 2 tons.
- If the heaters are electrical, then the total energy consumption is over 4 kw/ton.

All this adds 50-100% to the plant size and 100-150% to the energy needed to run it.

Precision control is a costly necessity

A. Current Practice

- Most plants in India are offered and installed with non-precision controls that are simply added to standard air conditioning equipment.
 - In addition to the standard snap action thermostat, which cycles the compressor, extra controls include a humidistat controlling strip heaters, or a reheating coil.
- The expansion device is not controlled, but is set to the lowest possible evaporation temperature while avoiding coil freezing.
- Available precision controlled act is much the same way except that the operating window is smaller and the μ P based PLC with PID action is faster and more accurate, with software supported scanning, recording and analysis of data.
- Thus since ordinary controls can not meet today's GMP standards, precision controlled are necessary for close control of both temperature and relative humidity.

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B. But....

- The μ P based controllers are costly enough to form a major component of the total capital cost.
- The imported technology requires new specialised skills to implement and is costly to maintain due to fast obsolescence.
- More frequent cycling is hard on the compressor.

C. The Bottom Line

- Precision control is costly but necessary.

Available Controls Are Energy Wasters

A. Wasting Energy By Compressor Cycling

- All controls have a lower thermostat setting which shuts the compressor off and a "cut in" setting which turns it on, to prevent going off design.
- Precision controllers have a smaller interval between the two points, so they cycle the compressor more frequently.
- This is not only hard on the compressor, but also wastes energy due to heavy inrush power at every start.

B. Wasting Energy By Reheating

- All controls use a humidity sensor which "turns on the heat" at the high setting and off at the low setting.
- Reheat energy from an external source, including hot gas from the compressor, will add to the cooling load.
- The refrigeration system will have to be bigger and will consume extra energy to remove the injected energy.
- Some precision controllers use more reheat to reduce the compressor cycling and thus waste even more energy.

C. Other Energy Wasters

- The compressor runs at low suction pressure, taking a 20% penalty in energy consumption.
- Chilled water/brine/hot water systems consume more energy due to high energy cost of brine, plus the pumping of the three fluids in addition to the refrigeration load.

D. The Bottom Line

- Available controls are not costly, but they waste energy.

The Answer

A. Integration

- Controls alone can not solve the problem; they must be incorporated into a specially designed refrigeration system.

B. Innovation

- Use an innovative Indian designed patented controller having
 - A single set point electronic thermostat with a sensor at the cooling coil output.
 - An active sensor clamped to the sensor bulb of the expansion valve.
 - A stabiliser attached to the active sensor.
 - Control evaporator temperature with it as follows:-
 - Set the desired dew point.
 - Any variation will send a signal to the active sensor, which will balance it with the temperature of the bulb and that of the stabiliser.
 - Appropriate action will be taken to increase or decrease the refrigerant flow to adjust the cooling rate and maintain the set point.
 - Reheat is provided by return air using another innovative and patented device called dual

pressure evaporator. Extra reheat is by hot gas if required.

- The compressor cuts off only if the R.A. temperature falls below a safety set point, or if the cooling coil is about to freeze over.
- In the fast cooling mode, the compressor gives its full cooling capacity, which is reduced by 20 to 30% in the low humidity mode. Since the other vendors's controls force the compressor to run at low temperature only, we save 25% to 50% in the compressor size and therefore in the plant size and the capital cost by switching between the two temperatures.
- The control is smooth; there is no compressor cycling. The set point window can be as narrow as required for the desired precision.
- For high humidity at low temperature, the air is not reheated but sent to a humidifier section to ensure 100% humidity.

C. Jubilation

- The above control is very simple; it does not need μ P or PID elements, nor does it need any software or ladder logic.
- The air conditioner in which it is fitted also has an economiser element which extracts the sensible heat from the return air before it enters the cooling coil and injects it into the supply air as reheat for low humidity.
- The combined energy saving is over 10,000 kwh per ton per year for 24 hours operation.

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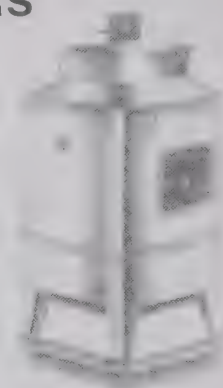
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Cooling Systems for Preservation of Fresh Produce

by
A. N. Mathur, Managing Director, Bie Cooling Systems

Introduction

Fruits and vegetables are living organisms which undergo all physiological and pathological processes associated with life. To sustain essential chemical and physiological activities, they draw energy from the food reserves stored within them prior to harvest. They are in a continual state of deterioration from harvesting on, and successful marketing depends upon reducing the rate of deterioration by slowing the processes which cause damage.

Deterioration results from many things, including physiological breakdown, physical injury to the tissue, moisture loss, or invasion by micro-organisms. All of the above factors can be interrelated, and all are influenced by temperature.

High Humidity Pre-Cooling and Storage Systems.

By nature, all freshly harvested produce at high temperatures deteriorates and dehydrates quickly; the need to immediately remove its field heat is vitally important if it is to keep its pre-harvested quality. These systems are designed to gain time by extending this life cycle enough for the produce to arrive at the market for the consumer in fresh and attractive condition. It is generally recognised that the one hour lost in pre-cooling, results in 8 to 24 hours lost in shelf life. (Refer fig.1)

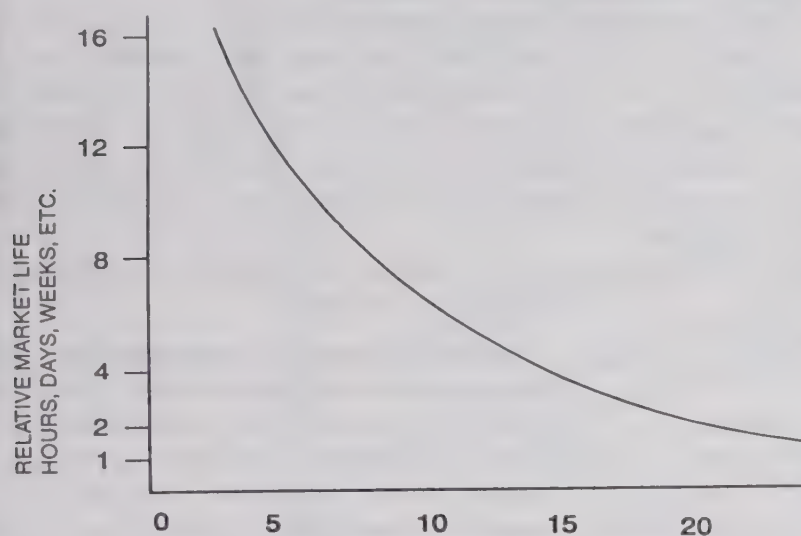
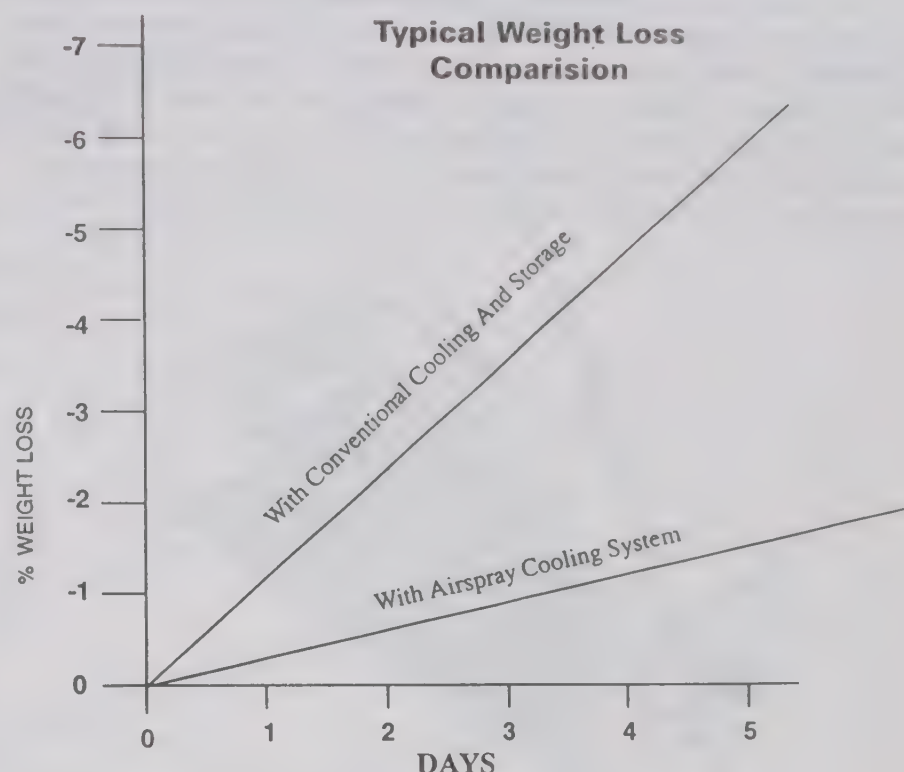


FIG. 1 - General Effect of Temperature on The Market Life of Fresh Fruits and Vegetables

It was thought in the past, the 80% to 90% humidity levels, maximum obtainable from conventional dry evaporation refrigeration systems, were adequate because of the common belief that a higher humidity would create mould and decay. It should be noted that produce being stored in a room at 85% humidity will lose moisture 6 times faster than in a room at 95%. (Refer Fig. 2). Loss of moisture not only causes wilting and shrivelling thus damaging appearances of produce and consumer appeal, but also results in loss in produce weight and direct loss in marketing. A 5 per cent weight loss (which is not uncommon) means 1 kg. less in each 20 kg. package.

The high humidity pre-cooling and storage systems are specially designed for quickly cooling most vegetables, fruit and flowers after harvesting or after ripening and then to maintain constant storage environments with ultra high humidities. Temperature range generally 1-3 degree C (10-15 degrees C for tropical fruits). Relative humidity 96% to 98%. Many products require such cooling systems. Typical examples are:



Vegetables : Such as Beans, Cauliflowers, Cucumbers, Lettuce, Cabbages, Carrots, Mature Green Tomatoes

Deciduous trees and Wine fruits: Such as Apples, Pears, Grapes, Lychees, Plums, Cherries, Peaches, Strawberries, Papayas, Watermelons

Citrus Fruits: Such as Oranges, Lemons

Tropical Fruits: Such as Bananas, Mangoes, Pineapples

Cut Flowers: Such as Lilies, Roses, Dahlias, Tulips.

Pre-cooling Methods: There are two types of pre-cooling methods, which are mainly used:

1. Forced Air-Cooling

These systems use specially designed ultra high humidity air handling units to produce a low temperature and high humidity air. These units operate on an "air-wash" refrigeration system which produces above 95% relative humidity. Basically, chilled water is circulated through a spray system and distributed over a cooling coil, INSULATED BOX, WATER SPRAY, LARGE WETTED SPACE, REFRIGERATION COIL, WATER ELIMINATOR, FAN, COLD AIR TO STORE, RETURN AIR, PUMP.

FIG. 3 - AIR WASH REFRIGERATION SYSTEM

and down through a direct contact heat exchanger or large surface area back to the reservoir. At the same time, air from the cool room travels counterflow to the water and is cooled and humidified by droplets of cool water and large surface area of the heat exchanger. A general diagram of the system is shown in Fig. 3.

The dew point temperature of the air leaving the unit equals the entering water temperature. The system ensures that the air temperature never falls below freezing. Because of continuous flow of water there is no need of any defrosting periods. This enables continuous operation and avoids temperature fluctuations in the storage area which can cause condensation and encourage mould growth.

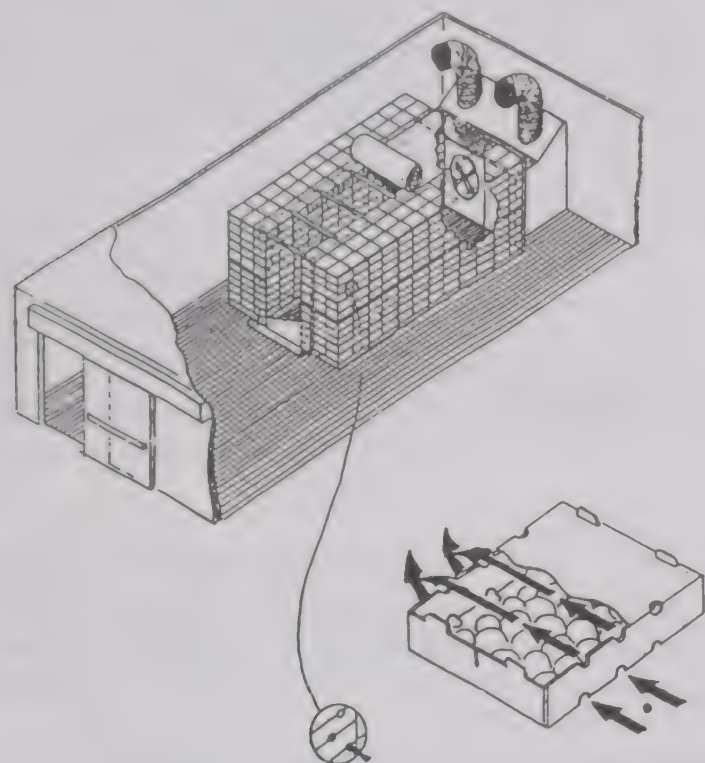


FIG. 4 - FORCED AIR COOLING

Forced Air Pressure Cooling: This is the most widely used method which involves disciplined stacking of produce boxes around the airspray, coupled with the use of air shroud, so that cooling air is forced through the stack of boxes. Because the cooling air comes in direct contact with the product being cooled is much faster than with conventional room cooling. Refer Fig. 4

Forced Air Continuous Tunnel Cooling : Another recent development is the commercial use of an automated cooling systems. The system works by passing the products through a cooling tunnel, which passes in front of the special air handler thus blast chilling the products. This process enables continuous operation and shorter cooling period.

2. Hydrocooling

This is a popular pre-cooling method wherever possible, because of its simplicity, economy and effectiveness. Hydrocooling is accomplished by flooding, spraying or by immersing the product in an agitated bath of chilled water. The hydrocooler cools the product by flooding as it is conveyed through a cooling tunnel. The chilled water flows briskly and uniformly over the surface of the product, thus ensuring a faster rate of cooling.

Hydrocooling is preferred for cooling peaches and vegetables like sweet corn, radishes and carrots etc. Hydrocooling is not suitable for such fruits and vegetables which are susceptible to decay and loss of quality when in direct contact with water.

Storage of Pre-cooled products

The products which are precooled need to be stored in a high humidity cold store before they are transported for distribution. The controlled atmosphere in the cold store is achieved by similar high humidity air handlers as described above. As the products are already cool, the refrigeration load for the cold storage is much lesser as compared to the precooling load.

Table 1 shows the recommended storage requirements for various products.

Table -1 Cooling & Storage Requirement for Fresh Produce

Commodity	Optimal Storage temp. Deg. C	Optimal Relative Humidity %	Chill Temp./ Freezing Temp. Deg. C	Approx. Storage life
Apples	0 - 4	95 - 100	-2	3 - 8 mths.
Beetroot	0 - 2	95 - 100	-1	4 - 6 mths.
Cabbage	0 - 2	95 - 100	-0.5	5 - 6 mths.
Carrots - mature	0 - 2	95 - 100	-1	5 - 9 mths.
Cauliflower	0 - 2	95 - 100	-1	2 - 4 mths.
Corn - sweet	0 - 2	95 - 100	-1.5	4 - 8 days
Figs - fresh	0 - 2	95 - 100	-2	7 - 10 days
Grapes - Vinifera	0 - 2	95 - 100	-1.5	3 - 6 mths.
Lettuce	0 - 2	95 - 100	-0.5	2 - 3 weeks
Lychees	0 - 2	90 - 98		
Peas - green	0 - 2	95 - 100	-1	1 - 3 weeks
Peaches	0 - 2	95 - 100	-1.5	2 - 4 weeks
Pomegranate	0 - 2	95 - 100	-2	2 - 4 weeks
Strawberries	0 - 2	95 - 100	-1	5 - 7 days
Topped Vegetables (incl. Beets, Radishes Turnips etc.)	0 - 2	95 - 100	-1	2 - 5 mths.
Guavas	7 to 10	90 - 98	2.5/	2 - 3 weeks
Mangoes	11	90 - 98	5/	3 - 4 weeks
Oranges	7	90 - 98	3.5/	3 - 12 weeks
Bananas-Ripening	18	90 - 98	11/	
Storage	13.5	90 - 98	11/	few days
Lemons	15	85 - 90	-2	1 - 6 mths.
Mangoes	15	85 - 90	4.5/	2 - 3 weeks

Optimal Storage Temperature: The temperatures shown in table 1 are those generally considered as optimum for the commodity. Unless produce is subject to chilling injury it is recommended that it be held as closely to its freezing temperature as possible without danger of freezing.

Optimal Humidity: An RH of 95 to 100 per cent is recommended for most fresh commodities that can be held near 0°C. Low temperature and high RH combined can reduce moisture loss enough to eliminate shrivelling and drying problem for most commodities.

Approximate Storage Life: This is the maximum time that one can expect a product to remain marketable under good storage and distribution conditions with considerable variations resulting from varietal, seasonal or handling differences. To obtain the longest market life, it is essential that the produce be properly handled before as well as during storage.



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Dr. J.S. Pruthi (b.1921) is a well-known Food Scientist & Technologist of National and International repute. During his brilliant professional career spread over 55 years, he has to his credit numerous National and International Honours & Awards based on his several patents, 10 professional books and over 350 R&D papers on different facets of Food Technology (some of which have been frequently published in the "Beverage & Food World" Journal). The Publisher, in collaboration with Dr. J.S. Pruthi, are therefore, pleased to announce the Institution of two Awards of Honour for the best paper published in "Beverage & Food World" in each Calendar Year :

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Microbiological Safety Aspects of Frozen Foods

by
Anand Kumar Jaiswal * D. Gupta ** & S.K. Sharma

Introduction

The potential for food to be involved in the outbreak of health threats is great. Outbreaks of food borne illness reminds all of us that there are compelling reasons for proactive control of food safety at all stages of food production, from production to consumption. It is estimated that seven million people a year are affected with food borne illness, and of that 700 die. The estimated medical cost and productivity losses for selected food borne pathogens is more than \$6 billion per year per USDA's economic research (USDA, 1993).

Incidents of food borne diseases highlight the importance of ensuring food safety for food professionals. For a food processing company pure, safe and wholesome food must be the minimum standard for consumer acceptance. Food quality, which includes not only highly acceptable organoleptic characteristics but also nutritional value and safety, has become the prime concern of the consumer.

Freezing is one of the oldest form of food preservation with the development of mechanical refrigeration and of quick freezing processes the frozen food industry has expanded rapidly. All the newer concepts of hazard analysis can be applied in frozen food industry for better managing food safety issues. First part of this paper deals with general concept of hazard analysis and its second part deals with application of these concepts for frozen food manufacture.

New Microbiological Challenges:

For the last few decades development of agricultural and modern science has made possible phenomenal increase in food production while also contributing many potential problems. It is not surprising, therefore that the increasing complexities of food technology and of nutrition science, coupled with the changing patterns of disease, should have necessitated the need of a system for food safety management. Preference for quick method of food preparation, convenience foods, fresh and 'fresh like foods', minimally processed foods and foods that meet specific health / dietary needs has increased. To meet these preferences and the needs of a growing population, new processing, preservation and packaging techniques have been incorporated into the manufacturing of food products. Distribution network has become large, centralized and complex. Changes such as these affect the epidemiology of food borne illness and present new microbiological risks (Knabel, 1995). In order to increase product palatability and acceptance, there has been a trend toward minimum processing time and temperature. Food additives of considerable chemical complexity are now routinely used in the industry. Formulation designed to reduce preparation time by the homemaker to the absolute minimum are common place in the market, and many of these are complex in composition and therefore in processing variability. Faster freezing processes such as newer liquid-nitrogen and carbon dioxide freezing which certainly improves food quality, are offering less microbial destruction than the conventional slower freezing methods.

In recent years there has been a move to change food to meet changing preferences for lower salt, less smoke and lower acid content of many foods. Foods such as less smoked fish, less highly cured meats, less acidic cheeses and milder natural ripened cheeses are such example. To some extent these changes are offset by greater sanitary control during manufacture. However lower acidity and milder heat treatment increases the likelihood of survival and growth of many pathogens. Food manufacturers have tended towards use of numerous HTST & UHT processes. Redappertization or irradiation pasteurization has recently received considerable attention, but inspite of being subjected to intensive investigation, yet there remains much that is not known about the microbiology of irradiated foods (Potter & Hotchkiss, 1974).

Potential for using conventional membranes filters for newer foods such as milk and other low acids foods and newer bacterial destructive methods such as X-ray, dielectric, UHT, microwave processes are gaining attention of food processors. Mishandling of such foods frequently will not result in the familiar spoilage pattern that warns consumers of potential dangers. Besides in an effort to keep unit cost low, food processors are increasingly using automatic and high speed processing equipments. There is wide spread concern that the introduction of minimally processed food and such unconventional processes would result in enhanced microbial risk.

The sum of these new variables has brought to the food processing industry an unprecedented degree of risk regarding food safety. The combination of these inherent risk with newly identified environmental hazards and possibly future nutritional risk makes the control of food processing, a task of monumental importance (Bauman, 1974).

Further several microorganisms that were not previously recognized as important food borne pathogens have emerged during the past two decades, adding to our microbial challenges. These pathogens include *Norwalk virus*, *Camylobacter jejuni*, *E-coil 0157 : H7*, *Listeria monocytogenes*, *Vibro vulnificus*, *Vibro cholera* and *Yersinia enterocolitica* (IOM, 1992; Doyle, 1991).

HACCP approach to ensure food safety:

HACCP or Hazard Analysis Critical control point is a

Table 1

HACCP Principles as defined by U.S. NACMCF (1992)

1. Conduct a hazard analysis. Prepare a list of steps in the process where significant hazards can occur and describe the preventive measures.
2. Identity the critical control point (CCPs) in the process.
3. Establish the critical limits for preventive measures associated with identified CCPs.
4. Establish CCP monitoring requirements, establish procedures for using the results of monitoring to adjust the process and maintain control.
5. Establish corrective action to be taken when monitoring indicates that there is a deviation from an established critical limit.
6. Establish effective record keeping procedure that document the HACCP system.
7. Establish procedures for verification that the HACCP system is working correctly.

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**Factory Manager, Bikaner Foods Ltd., A-28, Lawrence Road, New Delhi

preventive and effective means of assuring food safety. The HACCP systems, which is science based and systematic, identifies specific hazards and measures for their control. This is a tool to assess hazards and establish control systems that focus prevention rather than relying mainly on end product testing. Any HACCP system is capable of accommodating changes such as advances in equipment design, processing procedures or technological developments. HACCP can be applied through out the food chain from the primary producer to final consumer and its implementation should be guided by specific evidence of risk to human health (Codex, 1991)

HACCP is a process oriented preventive approach for assuring food safety. It recognizes the fact that end point performance testing of each product is often impractical, especially if the significant hazards are distributed heterogeneously through out the product. In this case, a simple sampling procedure can fail to detect potentially disastrous hazards in a significantly high proportion of time. Such a heterogeneous distribution combined with an uncertain frequency of risk is common microbial food safety hazard (Martimore and Wallace, 1994). HACCP is based on its seven principles which are given in Table 1. The key term used in HACCP system are:

(A) **Hazard:** Hazard is a biological, chemical or physical biological agent in, or condition of, food with the potential to cause an adverse health effect. Hazard is the potential to cause harm to the consumer-the safety aspect: or to the product-the spoilage or quality aspect and is present at any stage in the life of the product where unacceptable microbiological contamination or where growth or survival of unwanted microorganism may occur.

(B) **Hazard Analysis:** It is the process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP Plan. It is an identification of sensitive ingredients, critical control points (CCPs) and human factors as they affect product safety.

(C) **Critical Control Points** - CCPs are steps at which control can be applied and is essential to prevent or eliminate a food safety hazard in the segment of food chain under consideration.

The concept of HACCP is the result of a joint effort of the Pillsbury Co., the National Aeronautics and Space Administration, and the U.S. Army Natick Laboratories to attempt to create a zero defect program for zero defects in the production of food.

It is based on the Modes of Failure system initially developed by Natick laboratories, which consist of examining the product and all the components and the processes used to make it and asking what could possibly go wrong with the total system (Bauman, 1974).

It was realized that the system has wider application than the space program and following its presentations in the U.S. in 1971, it was adopted by Food and Drug Administration (FDA) in relation to the inspection of low acid canned food (Shapton, 1991).

In 1985, the National Academy of Science (NAS) recommended HACCP system in its report. Consistent sets of HACCP principles were adopted by National Advisory Committee on Microbiological Criteria in Foods (NACMCF) in U.S., by European Union for meat products in 1992 and for foodstuff in 1993. United Nations Food Standard Body (Codex) adopted HACCP in 1991.



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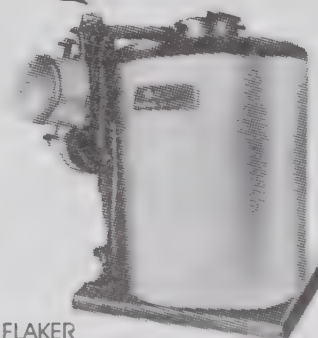
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Objective of HACCP:

The HACCP is a multidisciplinary science based approach to the issue of food safety. It is best considered as a philosophy with the structure based on certain degree of flexibility. The key adjectives of HACCP system are:

- to produce a safe product every time,
- to demonstrate that the process is safe,
- in the unfortunate case of prosecution can provide evidence of negligence
- to provide and promote confidence in the product.

In addition, a HACCP system can increase the participation of the work force, as advocated by Total Quality Management (TQM) approaches. The organizational structure and methods required for minimizing the risk of food poisoning it must incorporate a TQM approach. This requires an emphasis on an error-free operation rather than "purification" of the product after manufacture. In an organization, led by Management, every one should recognize personal responsibility for safety and quality. This means aiming to "get it right the first time" thus achieving safety and reducing the cost of quality.

HACCP serves as a step towards a larger quality management program such as ISO accreditation and prove to be cost effective technique by which process is updated (see Fig. 1).

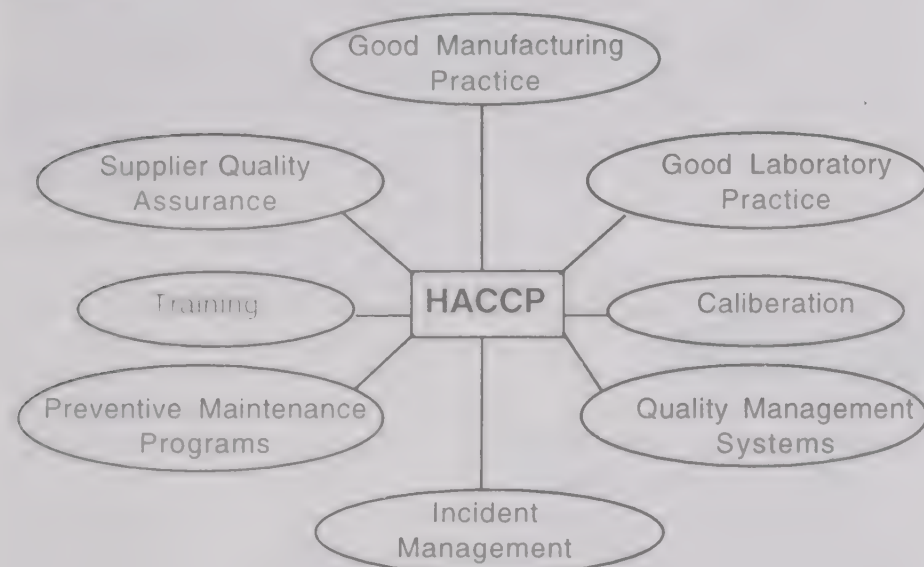


Figure 1.

Source - Sara Moritome Pillsbury Europe
(From Food Engg. Int'l Feb'98)

What is safe food?

A safe food may be defined as 'a product which is free of microbiological, chemical or physical hazards'. It is this which presents the minimum risk of illness to the consumers.

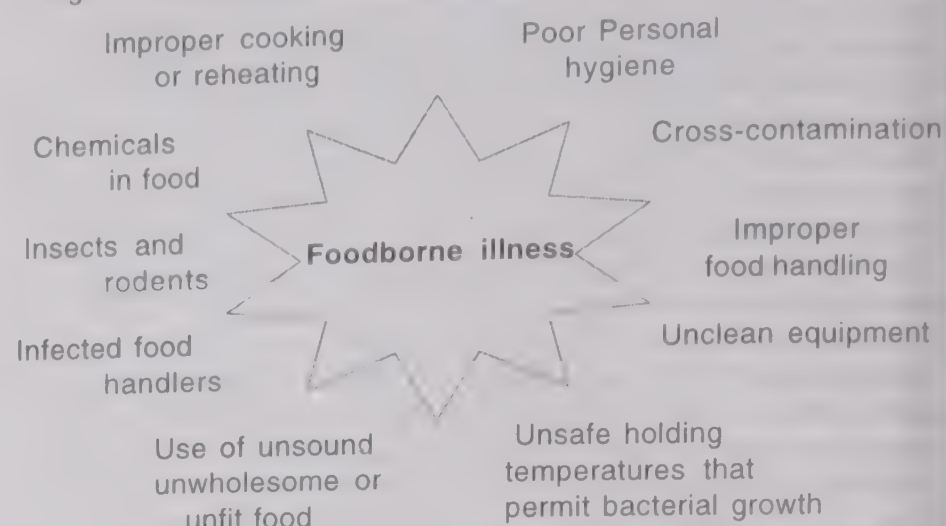
Food Borne diseases are subdivided into poisonous and infectious. Food Poisoning can be the result of either chemical poisoning or the ingestion of a toxicant (Intoxication). Infections refer to Food borne illness caused by entrance of pathogens into the body through ingestion of contaminated foods and the metabolite (Frazier & Westhaff, 1978).

When the incidence of illness arising from unsafe food is considered, illness caused by microorganism far exceeds those that are caused by chemical residues and toxicant including pesticides, food additives, natural poison or toxic substances and foreign materials. Assessment of risk associated with food safety presented at a conference in 1978 gave the ratio of 10,000 to 1 for microbial contamination to pesticide residue. Therefore to address, the food safety the main emphasis must be to reduce the hazards caused by the presence of unwanted pathogens in food including

those able to produce microbial toxin (Shapton-1991).

Factors that contribute to food borne illness are summarized in Fig. 2.

Fig. 2. Summary of factors that contribute to foodborne illness



Hazard Characteristics and Risk categories

In early 1960s the committee on "Salmonella" of the National Academy of Science-National Research Council (NAS/NRC) considered firstly, how to assess the degree of hazard of food, feeds and drugs and, secondly, whether sampling would provide adequate assurance that the food offered is a minimum hazard to the consumer. In their report published in 1969 they define three hazard characteristics which food could possess, and also five risk category of foods - the category depending upon how many hazard characteristics a particular food contained. Three general hazard characteristics are:

1. The product contains a sensitive ingredient or ingredients which can be assumed to be the potential source of contamination. A sensitive ingredient is defined as an ingredient known to have been associated with a hazard and for which there is reason for concern (NACMCF, 1992) The terms "ingredient" normally also applies to raw material.
2. The manufacturing process does not contain a controlled processing step that effectively destroys harmful microorganism.
3. There is substantial potential for microbiological abuse in distribution or in consumer handling that could render the product harmful when consumed, as the result of microbial growth.

Table 3.1 Categories of food products based on product hazard characteristics

Type of food	Hazard characteristic ^a			Category
	A	B	C	
Intended for infants the aged, and the infirm	+	+ or 0	+ or 0	I
Intended for general use	+	+	+	I
	+	+	0	III
	+	0	+	III
	0	+	+	III
	+	0	0	IV
	0	+	0	IV
	0	0	+	IV
	0	0	0	V

^a A = Products contains sensitive ingredient
B = No destructive step during manufacture
C = Likelihood for growth if abused
Source : OLSON (1975)

Hazard classification:

The combination of three factors can be used to classify foods as of consumer risk. If all three hazard characteristics are present in a product, it would have a hazard classification of "+++". If hazard is absent, a "O" would designate this, as follows: O++ = no sensitive ingredient, +O+= product pasteurized; and 000= no hazard involved.

Risk Categories.

The NAS hazard categories are as follows in order of decreasing risk.

Category I: A special category of non-sterile products designed and intended for consumption by infants, the aged, or the infirm.

Category II: Food products subject to all three general hazard characteristics (+++).

Category III: Food products subject to two general hazard characteristics (+00, ++0 or 0++).

Category IV: Food products subject to one general hazard characteristics (+00, 0+0 or 00+).

Category V: Food products subjects to non of the general hazard characteristics (000).

Table 1 from Olson (1975) relates the three hazard characteristics to five categories.

Microbiology of frozen foods

The microbiology of frozen foods begins with understanding the effect of temperature on microbial growth (Peterson and Gunderson, 1968). Freezing temperature slow down or stop growth and activity of microorganism in food and also retard chemical reaction and action of food enzymes. In general, freezing prevents the growth of food borne microorganism and refrigeration temperature slows growth rate. Except for *C. botulism type E*, temperature of 5 to 6°C or less, effectively retards the growth of all food poisoning organisms (Frazier & Westhoff, 1978).

Generally the pathogen common to food cannot grow below 3.3°C and grows slowly between 7 and 10°C. *Staphylococcus aureus* and certain *Salmonella* species can grow down to 7°C.

Clostridium Botulism type E may grow at 3.3°C under appropriate condition of anaerobiosis and freedom from chemical or other microbial antagonist (Potter & Hotchkiss, 1997).

Response of microorganism to freezing depends on many factors such as the kind of microorganism and its state, the freezing rate, the freezing temperature, the time of frozen storage and the kind of food.

The time required for freezing (or the freezing rate) has critical influence on microbial survival in frozen foods. There appears to a critical range of temperature which results in lethal effect, therefore faster freezing rates would tend to be less destructive since the critical range would pass through faster. High freezing temperature are more lethal, more organism are inactivated at -4 to 10°C. than at -15 to 30°C (Frazier & Westhoff, 1972).

Slow freezing to a final temperature of -10°C is more lethal than rapid freezing to a final one of 20°C. During slow freezing ice crystals form to concentrate the soluble solids that affect the stability of the cellular protein. During rapid freezing it inactivate the solutes (Sandine, Ayres & Mundt, 1980). Since faster freezing improves food quality a balance between food quality and microbial quality needs to be established.

Some frozen food receives no heat treatment during their preparation, others may receive microbiologically inadequate heat treatment just to achieve the processors' objective such as blending a sauce or gravy, therefore

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frozen food must be safe before freezing if they are to be safe after freezing. In the case of precooked food, post-process contamination must be avoided and there should be minimum time of holding between cooking and freezing.

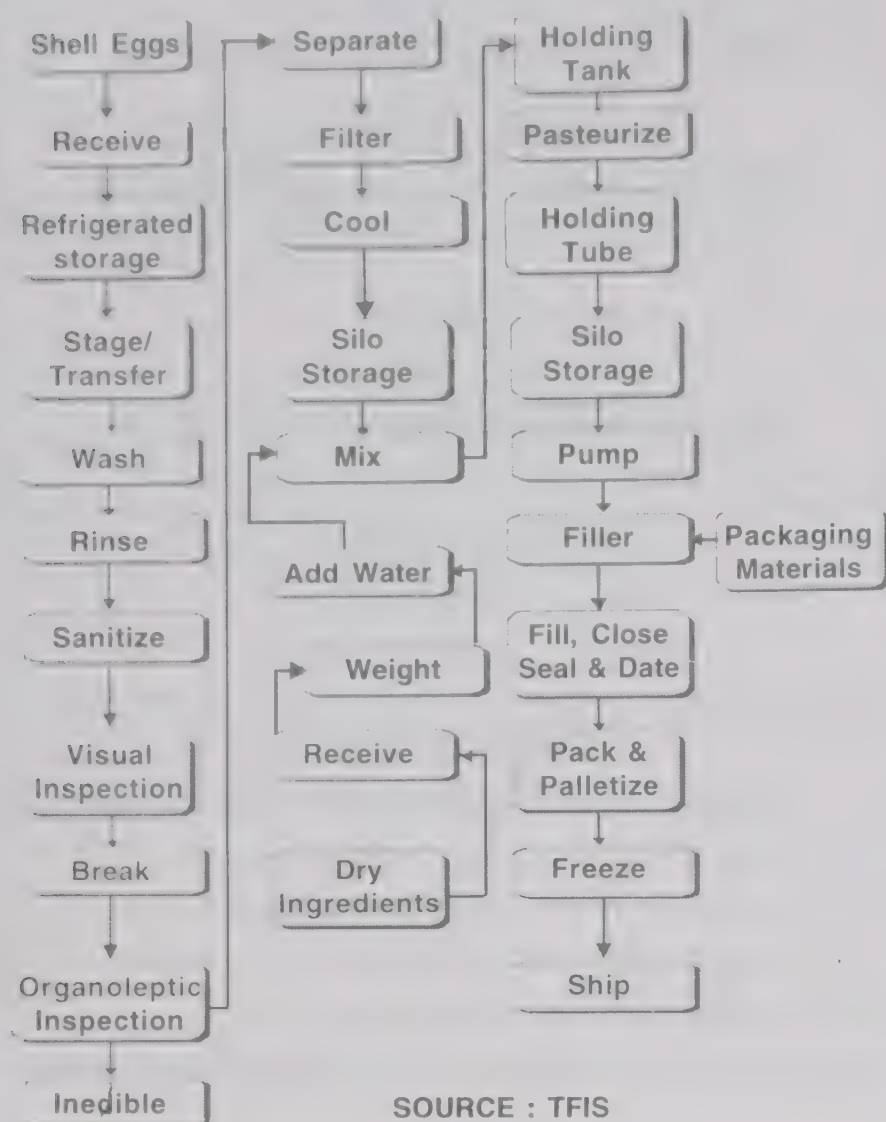
Generally there is no such procedure applied by processors which are primarily intended to sterilize the frozen food product. Therefore the cardinal principle of frozen food microbiology is that ingredient food material must be good to begin with "Laundry Techniques" for the rehabilitation of microbiologically unsound foods are impractical, usually pointless because of other adverse quality effects, hazardous, and unacceptable (Peterson *et al.*, 1974).

CCPs in the production sequence:

Critical control points for frozen food processing will include one or more of the following aspects of the production:

- 1) Maintenance** - Adequate maintenance is required for the building, equipment, utensils and all others physical facilities of the establishment including drains. Where possible rooms should be kept free from steam, vapour and surplus water.
- 2) Cleaning and Sanitation** - Cleaning and disinfection is required to prevent contaminations of food from fifth and care must be taken to ensure that food is not contaminated by cleaning product residues. Equipment sanitation is must for preventing and controlling microbiological contamination of ingredients and product.
- 3) Personal Hygiene Practices** - Employee must maintain a high standard of personal cleanliness Good personal hygiene of food handlers is an essential factor in reducing the risk of food poisoning. Food handlers must be aware of the source of bacteria to prevent the

Fig. 3: Flow diagram for manufacturing of frozen pasteurized scrambled egg mix



SOURCE : TFIS

contamination or cross contamination of food by the food handles.

- 4) **Pest Control and Infestation** - Pests and rodents pose critical threat to food safety program. All preventive exclusive measures should be taken so that their access must be eliminated or reduced to a minimum in food production and storage premises.

5) **Microbiological Population Critical Control** - These are used on ingredient, materials in process and products. They help to determine whether the material analyses conforms to the established hazard limitations and whether a particular process or processing sequence is being controlled within predefined acceptable limits. All the possibilities of contamination of ingredient and product with food pathogens must be checked. Food manufacturers should always intend to produce frozen foods with minimal on acceptable levels of certain microorganisms. Therefore all the ingredients, must be purchased under strict microbiological criteria under Suppliers Quality Assurance (SQA). Aerobic Plate count and Colliform test can be the basis for acceptance of raw material.

6) **Time and temperature control** - Microbial growth is greatly dependent on temperature and also the time available for microbial proliferation. Air temperature of rooms for meat preparation, temperature of the food itself and specified maximum holding time for many ingredients even in the refrigerated state are few examples.

Consumer Abuse

For food safety management of frozen foods, potential for consumer abuse is an important consideration. There must be through assessment of possibility of microbial growth during transport & distribution and preparation by consumer. The other factors to be considered are pH of the product, water activity, the presence of microbial inhibitors, the type and effectiveness of food processing as it affects the microbial population, the atmosphere within the package and the storage and distribution temperature.

For example in frozen precooked poultry maintaining the freezing condition during distributions and transportation also minimizes the number of organisms but the possibility of consumer abuse still exists if the products were allowed to thaw for an indeterminate period of time and held at an elevated temperature. Neither precooking nor refreezing would necessarily eliminate all the pathogens, so it is possible for incubation to occur and dangerous population to build up (Baumam, 1974). Food taken out of deep freeze must first be thawed thoroughly and then cooked

Table 3: Hazard Analysis and Preventive

(A) STEP	(B) IDENTIFIED HAZARDS	(C) PREVENTIVE MEASURES
Shell Eggs	Microbial pathogens (e.g., Salmonella); chemicals (e.g., pesticides)	Adhere to purchase specifications and pre-certify vendors
Dry ingredients and packaging materials	Microbial pathogens for milk solids, additives and packaging material should be food grade	Adhere to purchase specifications and pre-certify vendors
Refrigerated storage of shell eggs	Microbial pathogen growth	Temperature controls, follow GMPs for pesticides application
Wash	chemicals (e.g. pesticides)	Proper water temperature and pH
Filter	Microbial contamination	Proper equipment maintenance and change filter
Cool	Physical	Rapid cooling
Pasteurize/Holding Tubes /Silo storage, Fill, Close, seal & Date/Pump/filter	Growth of hazardous microorganisms	Proper sanitation
	Microbial contamination from improper sanitation	Proper sanitations, proper codes, use instructions and date
	Microbial contamination from improper sanitation (for recall purposes)	
Freeze	Growth of hazardous microorganism	Proper time and temperature control and proper spacing

immediately. The ability of several bacterial pathogens to multiply rapidly to dangerous level in foods allowed to warm up or to remain warm for an extended period is responsible for their frequent implications in food borne illness (Knable,1995).

Example of Hazard Analysis

There are arrays of frozen foods like fruits, meat, poultry, seafood and fishing product, vegetable, dairy desert products etc. As here discussion of each and every process is not possible, we are taking example of few typical processes to illustrate the application of hazard analysis.

(I) Frozen pasteurized Scrambled Egg mix

The product, frozen pasteurized scrambled egg mix is prepared from shell eggs, milk solids, citric acid, guar gum and water. Whole

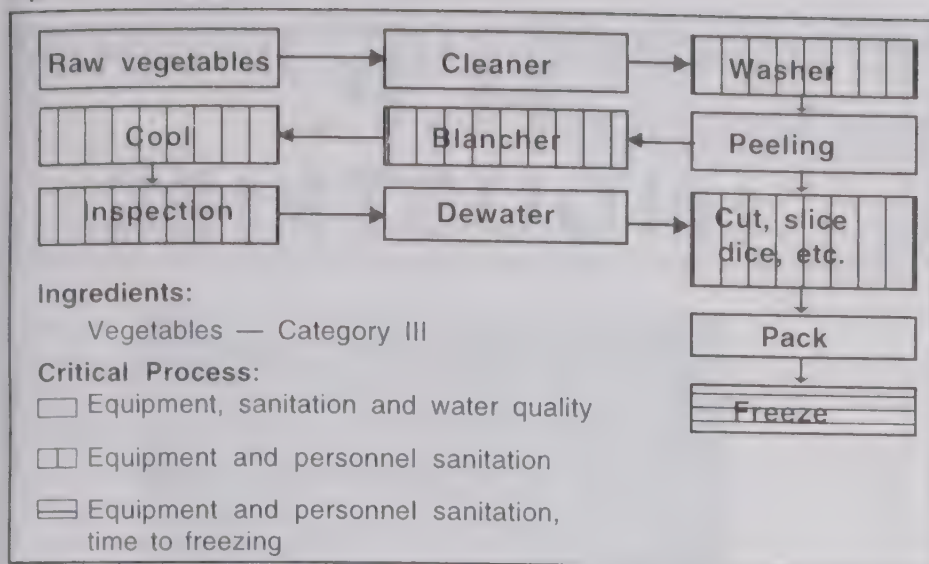


Fig.1 — **Frozen Vegetables** — flow diagram and identification of critical control points (based on AFFI, 1971a)

eggs and ingredients are mixed, pasteurized, filled into 5LB gable-top waxed fiber containers, and frozen. The product is distributed under normal frozen food channels for institutional use. Product can be held for one year at 10°F or solidly frozen. Defrosted product can be held for 3 days at refrigeration temperatures. The product is to be cooked before consumption, process flow diagram is given in Fig. 3. All the significant Hazards associated with each step in the flow diagram and preventive measures to control, these are summarized in Table 3. This process is developed by Technical Food Information Spectrum (TFIS), 990 Hammond Dr. Suite 840, Atlanta, GA 30328 (800-248-8347) in conjunction with USDA poultry division-Grading Branch, Egg product industry.

Frozen Vegetable

Flow diagram for the production of frozen vegetable is given in Fig (7) at the washing, blanching, cooling and cutting points, the critical process controls are equipment sanitation and water quality. At inspection, equipment sanitation and personal sanitation are CCPs. At freezing, equipment and personal sanitation plus time to freezing are CCPs. Air quality in air blast IQF freezer would be a further factor to be controlled.

Quality of water used for washing and equipment sanitation must be controlled or it may increase microbial load. During blanching sufficient steps to be taken to sterilize or eliminate microbial population to a significant low level. Poor sanitation condition can lead to heavy contamination during cutting, slicing and dicing operations, prompt and proper freezing at the end is important C.C.P. Pesticides & Herbicides residues, quality of raw material, micro biological analysis of end product are other controls. Total safety considerations are para-mount in each step of process.

Conclusion

The potential for food to be involved in the emergence of microbial threats to human beings is great, specially in India, due to lack of proper infrastructure and distribution network for frozen foods coupled with wide spread consumer unawareness, there are many points in food system at

which food safety can be compromised. Education and consumer awareness programs must be taken by food community for increasing public awareness of food borne diseases. Everyone in food system from food manufacturers to consumers must recognize the need for controlling microbiological hazards.

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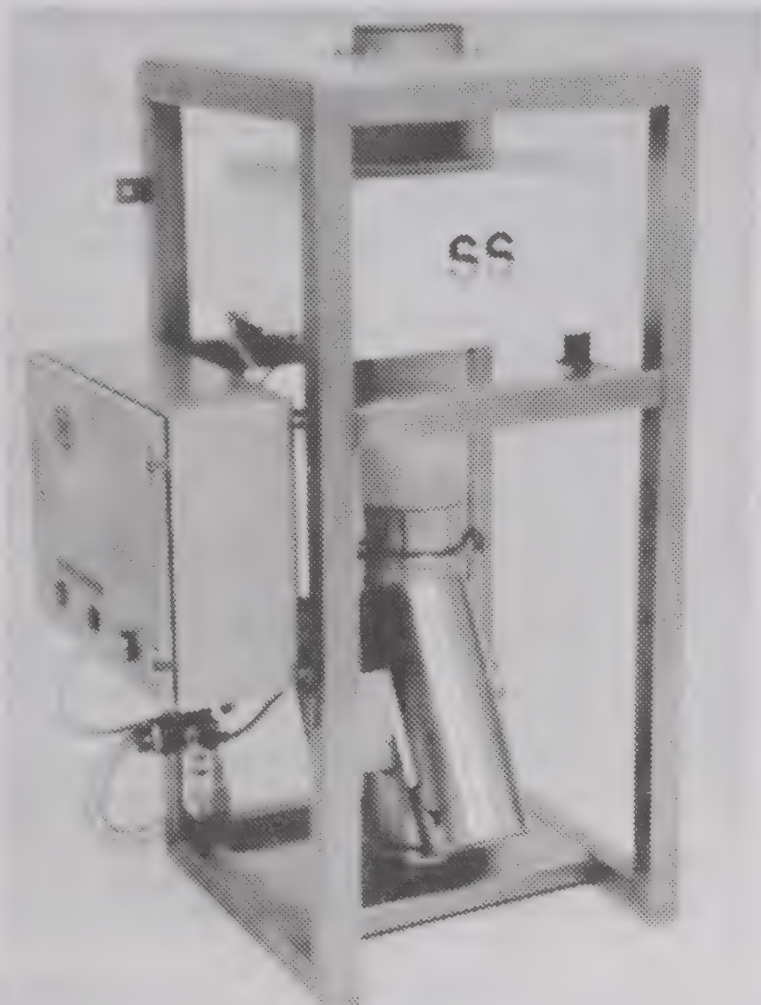
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Modular Cold Storage Systems for Horticulture & Floriculture Products

by
M. Sridharan

General:

Following is a brief presentation on pre-cooling, packing, grading, pre-cooling walls, final storing, and temperatures etc. details.

It is important to realize that everything depends on (a) management, (b) logistics and (c) the time of departure of the plane.

Most flowers have to be kept in buckets of water while some flowers have to be kept dry. Not all the flower can be put together. For example, Roses and Carnations cannot be put together because of the difference in temperature requirement, and Carnations can develop Ethylene which is bad for flowers.

After pre-cooling this is no longer a problem.

The final room temperature for Roses should be +2°C.

The final room temperature for carnations should be +4°C to +6°C.

Do not put Flowers together with Fruits and Vegetables!

We give here general information and not information specific to one kind of flower/fruit.

Refrigeration

Why refrigeration?

Flowers, Vegetables and Fruits are all still living products even when cut off from their roots, bulbs or branches. They still grow and respire.

Higher the temperature, higher the respiration rate and shorter the life of the flower/fruit.

When we cool down the product, the respiration rate slows down and thus the product is in good condition for a longer period.

Sizes of Cold Storage and Packing areas

Total cold storage, 50m² per hectare, divided between the pre-cooling and final rooms:

Pre-cooling room 1/3 and

Final cold room 2/3,

Packing and grading: 100-150 m² per hectare.

Temperatures

Precooling: 6°C to 8°C.

Final store: +2°C, except for Carnations and Chrysanthemums which are to be kept at +4°C to 6°C.

Anthuriums which are to be kept at +20°C require air-conditioned packing and grading area.

Packaging and grading area temperature is +20°C; the capacity is based on a temperature of 10°C to 12°C in these surroundings.

Routing: (Please refer the flow chart also for quick reference).

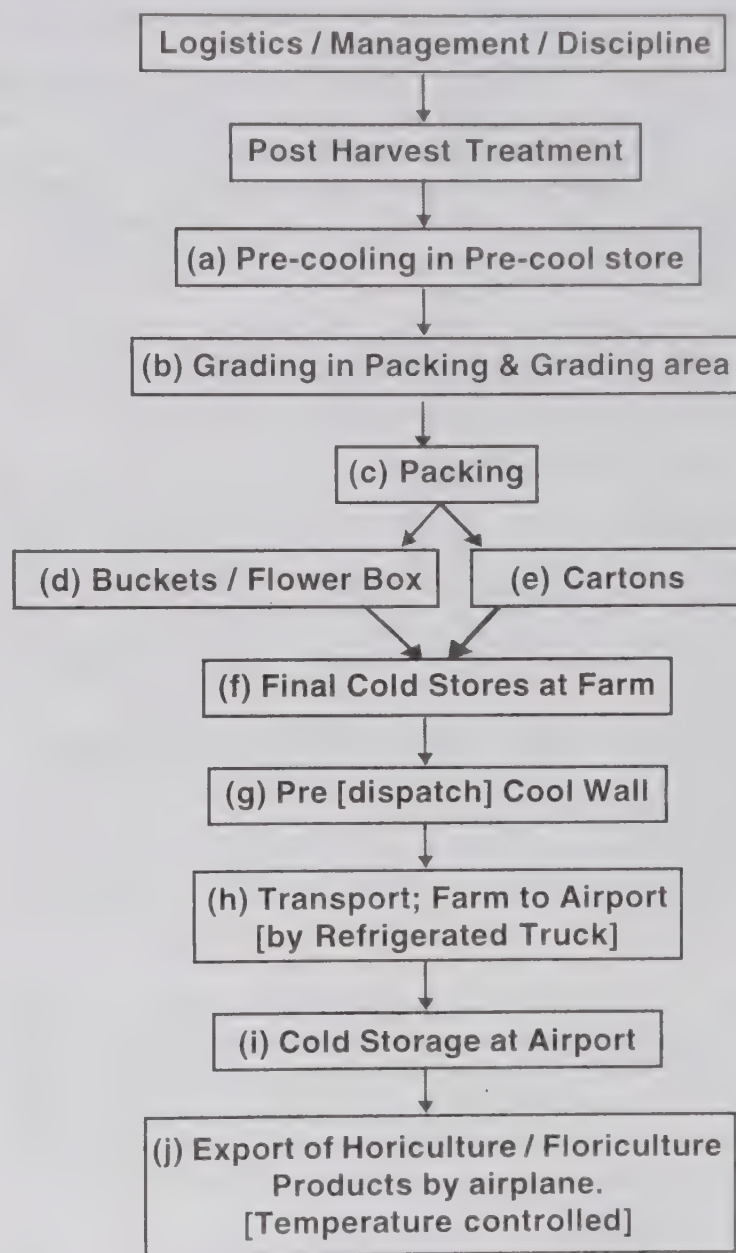
The best quality is achieved when the flowers are harvested early in the morning before the day becomes hot. The flowers have to be put in buckets of pre-cooled water and brought in as quickly as possible to the pre-cooling store.

Pre-cooling Store

Here the flowers are cooled down to 6°C-8°C. They remain here until they are graded and/or packed.

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Flowchart for Post Harvest Preservation of Horticulture and Floriculture Products



cooling will take 4-6 hours depending on the temperature of the flowers when they are brought in. At higher ambient temperatures, adjusting the temperature of the pre-cooling store to 8°C-10°C or 10°C-12°C is recommended.

Too big a temperature shock can be bad for some types of flowers.

Grading and Packing

The best way of doing this is in an air-conditioned area with a temperature of +20°C. Depending on the time of departure of the plane, the flowers should be put in carton boxes or in buckets of water. Most flowers are kept in water while some flowers are kept dry.

Final Cold Room

Here, the pre-cooled product can be stored for the designated period at around 2°C waiting for onward dispatch. Normally the storage period for flowers may be 2 to 2-½ days.

Pre-Despatch Pre-Cooling Wall

When the flowers are packed, it is no-longer possible to

cool them down in a normal cold store. The temperature of the flowers rise slightly in the packing and grading area. To take care of this, there is a unique pre-dispatch, pre-cooling wall. It is situated in the final room and with special fans the cold air is drawn from the final cold room through the boxes.

Depending on the temperatures of the flowers in the boxes and how many flowers are put in, they can be cooled down from +15°C till +2°C in roughly one hour. As you can see, there are holes in cartons, which have to be closed with stickers after precooling. The flowers are now in a very good condition to be exported. This does not mean that they can be transported without refrigerated transport and left to stand in the sun at the airport.

Another benefit of the pre-cooling wall is that if the flowers have to be graded and packed in a hurry, the pre-cooling room may be skipped, the flowers can be graded and packed and put on the pre-cooling wall. The flowers in this case may be warmer than out of the pre-cooling room and it will take roughly two hours to cool them down to +2°C.

Trolleys

We recommend the use of trolleys for transport from the greenhouse to the pre-cooling room and from the pre-cooling room to the grading and packing area, etc.

Construction of Cold Stores

The wall, ceiling and partitions of the Cold stores are built out of prefabricated sandwich insulated panels with Hard Foam Styrene which is **recyclable and environmentally friendly**. The Panels are of a light but strong building materials. It is very hygienic, easy to clean and it is very easy to install the coolers, piping, lighting and electric wiring.

With these panels, there is no need of brick walls.

The modular construction facilitates easy modifications to the layout in future, if needed.

The recommended insulated thickness for the pre-cooling and final rooms is 12cm and for packing and grading areas 7cm.

Doors

Options are hinged and sliding doors. The hinged doors are the most economical and have a size of maximum 140 cm width and 24 cm height. The width of a sliding door is up to 3M and the height up to 350cm. For flowers on trolleys, a door of 140 x 250 cm high is very good. Dock seal can be provided for connecting and loading onto refrigerated trucks.

Layout of Building and Cold Stores

The layout consists of a pre-cooling room and a final room and also packing and grading half. If you would like to expand the building, it can be easily done on this modular construction.

What kind of Building

We can install cold stores inside a concrete building or it can be built with just steel construction and roofing. It should be recalled that an absolutely flat floor is required for the spot where we are to build the panel walls. Also a flat floor is required for trolley transport.

Refrigeration Plant

The four main components are:

- compressor
- condenser
- evaporator
- control panel with electric wiring (we have a lot of controls)

Generally the cooling capacity is roughly based on the product load and ambient temperatures. The selection is very important.

Compressor

There are two types of compressors:

- the open type with separate electric motor, or
- the sealed type (Hermetic)

The open compressors are more suited for conditions where the electricity supply is not optimum. This system is with a separate electric motor so that when something goes wrong with the motor due to poor voltage conditions, your refrigeration system is safe. An electric motor, which is separated, can easily be repaired. However, in some situations, sealed type is also used.

Condenser

The size of the condenser is very important because it affects the capacity of the installation. We use large condensers because of high ambient temperatures. Wherever feasible, Water Cooled Condensers are used in order to keep the compressor discharge pressure low and thereby get better energy efficiency. This means substantial savings in recurring energy cost month after month.

Evaporator

The size of the evaporator is also very important. Large the size, higher is the humidity. Smaller the cooler, lower is the humidity. If the flowers are dried out with a small cooler, the quality can be ruined. Air circulation is very important. The air is our medium and the product has to be cooled down with cold air. The air must reach every place in the room otherwise a temperature difference in the products may arise.

Control panel

Our quotations are complete with electric control panel, electric wiring and lighting.

Service and Maintenance

When we install the project, we recommend that the local refrigeration engineers and electrician are instructed during the installation by us in order to enable you to solve minor problems yourself. We suggest a visit by an engineer once or twice a year for check-up purposes.

The general types of construction are as under:

1. Conventional buildings with RCC frames, brick walls and the truss type sheet roofs or RCC slabs with internal floor structure of RCC or Steel frame with wooden steel grating.
2. Building with single floor structure designed for mechanised loading and unloading of products.
3. Structures designed with cold chambers constructed from pre-fab insulated panels.

Thermal Insulation

In case of conventional construction materials like expanded Polystyrene, Fibreglass, Polyurethane or similar are used for the insulation of the cold chambers. The latest trend is to use sheet metal cladding in place of the cement and sand plaster finish.

Prefab Insulated Panel structure

The development of insulated panels has brought in a revolution in cold storage construction the world over. Although, these panels have been in use for cold storage construction for over two decades in developed countries in India, the prefab panels have been introduced around 10 years back. The prefab panels also called Sandwich panels are, mainly, available in two types.

- 1) EPS panels with EPS bonded to the sheet metal skin by using special glue.

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Energy Savings in Refrigeration Systems

by
S.M. Gokhale

Introduction

Refrigeration plays a major role in the processing of foods and beverages. It is widely used in the manufacturing process for product cooling or freezing and also for preservation of products. It also finds application in air-conditioning of some manufacturing areas where the temperature and relative humidity as well as cleanliness of air in the production hall are important to maintain product quality. In some industries, the refrigeration equipment consumes upto 40% of the total electric power in the factory.

Howsoever important it may be, refrigeration is a part of 'utilities' required for the manufacturing process and many a times it is found that project managers who opt for quality production equipment settle for a lower priced utility equipment, even though it may be consuming more power. Such types of equipment cost much more in the long run due to the recurring cost of electricity.

Power consumption is related to ambient temperatures

The refrigeration equipment works on the principle of heat rejection to the atmosphere. A good system engineer can make best use of favourable atmospheric conditions to design a most efficient energy system. The refrigerant in the system is continuously recycled. It is fed to an evaporator in its liquid form, where it extracts the heat from the media being cooled. In the process the liquid refrigerant evaporates. This evaporated refrigerant needs to be condensed (liquefied) so that it can be used again. This process of condensation requires removal of heat from the refrigerant for which the natural cooling media available are air and water. Out of these two, using water provides the most energy efficient option. In a manufacturing unit, availability of water is seldom a problem. However for conservation, the cooling water is also recycled by using a cooling tower.

The temperature of water available from a cooling tower depends on:

- The ambient wet bulb temperature
- Capacity of the tower
- Efficiency of the tower

A well designed cooling tower system can provide cooled water at a temperature of about 3°C above the ambient wet bulb temperature.

The temperature at which the cooling media is available is a deciding factor in the selection of a compressor in the conventional 'vapour compression' refrigeration system. The compressor, is used to compress the refrigerant vapour upto a certain predetermined pressure so that the vapour can be condensed using the natural cooling media available. For example, in a coastal area like Mumbai, the maximum ambient wet bulb temperature is 28.3°C. Water can be made available at a temperature of 31°C from the cooling tower. Using this water at

31°C and a properly designed system, the refrigerant can be condensed at a temperature as low as 39°C. The compressor, therefore, has to compress the refrigerant upto a saturated pressure corresponding to this condensing temperature. It is also possible to design a system for a 45°C condensing temperature using the same water at 31°C in lesser quantity, and also with a smaller refrigerant condenser. In this case the compressor has to compress the refrigerant upto the saturated pressure corresponding to this condensing temperature of 45°C. The saturated pressure in this case is more than that at 39°C. Considering identical evaporation temperature, the compressor has to compress the refrigerant to a higher pressure when condensing at 45°C. This results in an increase in the compression ratio of the compressor which requires more electrical energy as the compressor has to do more work. Also when the compression ratio increases, the capacity of the compressor decreases. Thus, in effect more power is consumed for obtaining less refrigeration effect.

The example given below illustrates the power savings that can be achieved. All the power consumption figures are taken from manufacturer's catalogues.

In a cold storage, plant designed for 16 hour plant operation at 49 T.R. capacity at 39°C condensing temperature, the compressor would run for 16 of the 24 hours to maintain the room a temperature around the clock. However, the same compressor would actually run for 17½ hours if operated at 45°C condensing temperature. The power consumed under normal operation at 39°C condensing temperature would be $(38.76 \times 16) = 620$ units, whereas if the same compressor runs at 45°C condensing temperature, it would consume $(42.86 \times 17.5) = 750$ units. The extra power cost on the compressor alone would be for 130 units per day. At an average unit rate of Rs. 4/-, this translates into a Rs. 520/- extra operating cost per day.

Apart from the above, operating the compressor at such high pressure and temperature, hastens the compressor overhaul. The chances of refrigerant leakage is also more at higher operating pressure.

The above figures clearly illustrates the price the owner pays for permitting this condition. And larger the plant higher is the cost of inefficient operation.

Practical example :

Refrigerant : R-22

Compressor speed	Temperature of media being cooled	Evaporating temperature	Condensing temperature	Compressor capacity	Power consumed	
RPM	Deg. C	Deg. C	Deg. C	K.Cal/Hr.	T.R.	B.K.W.
1450	5	0	39	147000	49	38.76
1450	5	0	45	135000	45	42.86

Comparison of compression ratios

1	2	3	4	5
Evaporating temperature	Compressor evaporating pressure	Condensing temperature	Compressor discharge pressure	Compressor ratio
	a	b	a	b
Deg.C	PSIG	PSIA	PSIG	PSIA
0	57.6	42.9	202	187.4
0	57.5	42.9	236	221.4
				(4b/2b)
		Deg. C		
		39		4.37
		45		5.16

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Generally excessive condensing pressures can be reduced easily. In most cases, either more condensing surfaces and cooler or more condensed water is required.

In well designed refrigeration systems, the causes of high condensing pressures are either non-condensable gases in the system and/or dirty condenser and/or dirty cooling tower fill. The condensers become dirty due two main causes. The first cause is scales, formed inside the tubes by hard water or scale forming cooling water. The second cause is the dirt and dust that blows into the cooling tower basin and settles in the condenser tubes. These conditions can be corrected easily. Periodically, the non condensable gases should be purged from the condenser. The condenser tubes should be brushed, cleaned and also descaled by circulation of acid and subsequently circulating caustic soda to neutralise. The cooling tower fills should also be periodically cleaned by a jet of water. It may also be necessary to replace the cooling tower fills every few years.

Discharge pressure ranges, normal operation:

Ammonia	160 to 210 PSIG (11 to 14 Kg/cm ²)
R-22	170 to 210 PSIG (11.5 to 14 Kg/cm ²)

Tips on Compressor discharge pressure

Higher discharge pressure indicates:

- ◆ non-condensable gases in the system
- ◆ dirty condenser
- ◆ inadequate condensing water
- ◆ condensing water is not cool enough
- ◆ inadequate condensing surface

Low discharge pressure results in:

- ◆ increased system capacity
- ◆ decreased power consumption
- ◆ less wear and tear on the compressor, motor and seals
- ◆ longer life of refrigerant and lubricating oil

Contd. from Page 30

Modular Cold Storage Systems for Horticulture & Floriculture Products

- 2) PUF panels using Polyurethane as insulation material foamed between the two metal skins. These panels are structurally strong and have a better insulation value as compared to EPS panels for a given thickness.

Insulated panels have been used for making cold stores, right from the small Walk-ins to very large cold stores. In fact the application of panels have gone beyond the cold stores sector and the panels have been used for the construction of the processing plants, prefabricated houses, warehouses, clean rooms, etc. The panels have also been used for fabricating the door for the cold stores which are light and simple in construction as compared to the conventional insulated doors.

The highlights of the panel construction are as follows:

1. Greater flexibility and faster construction.
2. Better thermal efficiency due to a better isolation between outside and inside.
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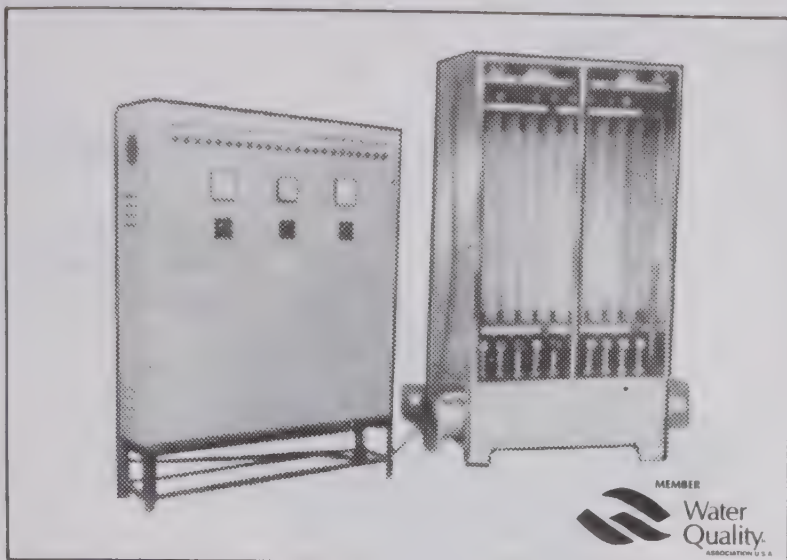
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Household Evaporative Cooler for Storage of Fruits and Vegetables

by
S.H. Suryawanshi and P.A. Unde

Abstract

Abstract
A household evaporative cooler of size 450mm x 450mm x 600mm having capacity of 25 to 30 Kg was constructed. The low cost materials viz., wood wool, wala sheet, wooden batten, wire mesh, aluminium were used for the construction. The various fruits, vegetables, and leafy vegetables could be stored for 10 - 15 days with a maximum weight loss of 5%. The quality of the stored material was found nearly fresh and tough in texture. The cost of the household evaporatory cooler is approximately Rs. 1200/-.

Introduction

India is the second largest producer of fruits after Brazil and second largest producer of vegetables after China. It produces about 11% of World's vegetables and 9% of World's fruits. In India the estimated annual production of fruits and vegetables is about 130 million tonnes contributing over 18% of the gross agricultural output of the country.

It is estimated that the total loss of fruits and vegetables is about 30 to 35%. This is mainly due to inadequate postharvest handling, transportation and storage facilities. The main purpose of storage of fresh fruits and vegetables is to extend their period of availability and shelf life. The shelf life of fruits and vegetables could be increased using cold storage facilities, which is costly. Therefore, an effort is being made to design and develop a low cost evaporative cooler, and its feasibility was studied at the household level.

Evaporative cooling occurs when air, that is not already saturated with water vapour, is blown across any wet surface. Thus, an evaporative cooler

consists of a wet porous bed through which air is drowned and is cooled and humidified by evaporation of a water. In hot climates, the evaporative cooler reduces dry bulb temperature and raises the humidity and usefully aids in the preservation of fresh fruits and vegetables.

Materials and methods

A household evaporative cooler for 25 to 30 kg. capacity was constructed using the wood wool, wala sheet, wire mesh, wooden batten, aluminium plate and angle. The size of evaporative cooler taken was 450mm x 450mm x 600mm. The construction details of household evaporation cooler are given in fig.1.

The base of the model was a square tray of size 600mm with a depth of 50mm made up of galvanized iron sheet. It

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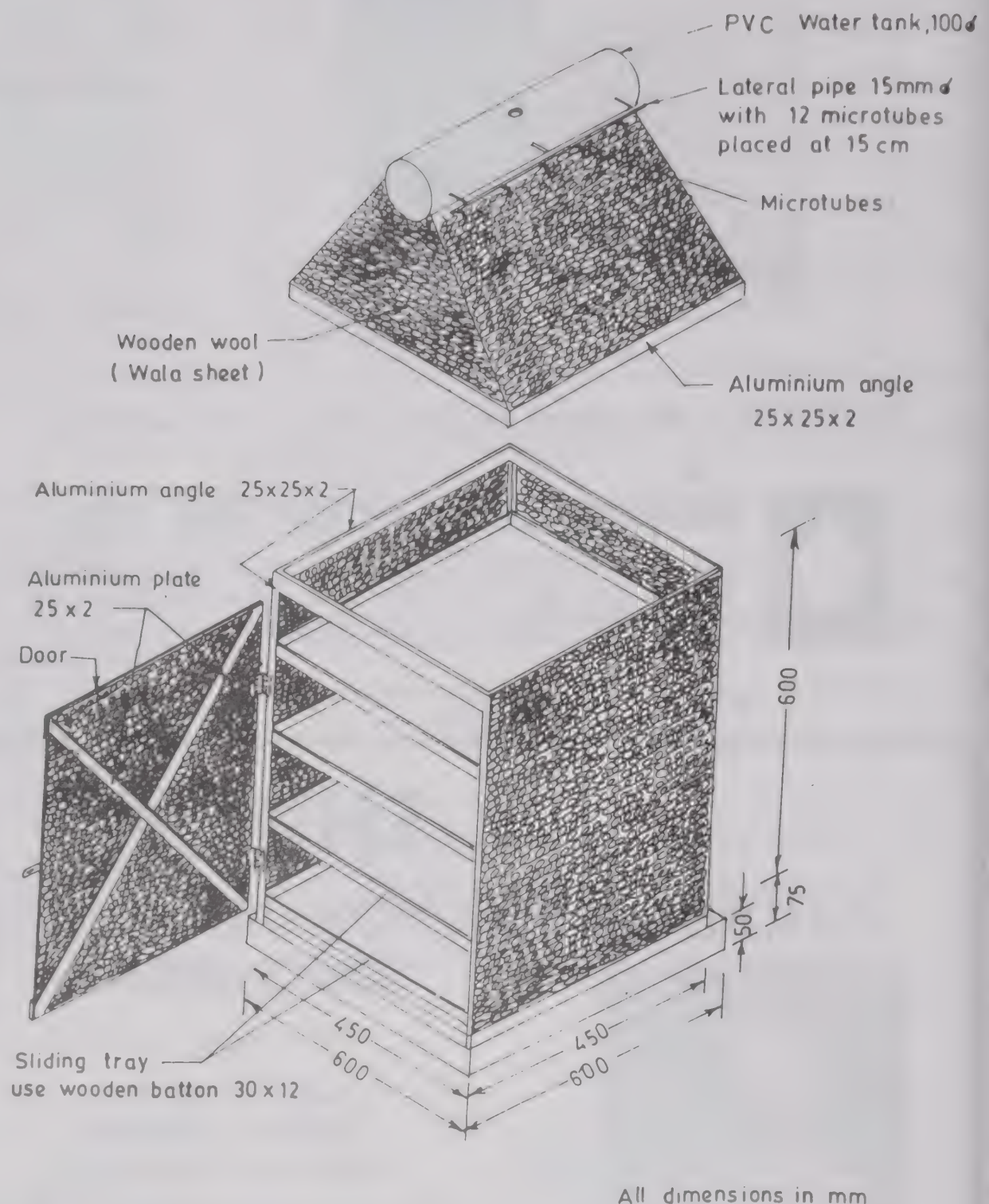


Fig. 1 Constructional details of Evaporative Cooler

has three walls, a roof of triangular shape and a front door. Each layer consisted of a uniform 25-30 mm thick layer of wood wool equally distributed. The frame was made up of aluminium angle and plate having size of 25mm x 25 mm x 2mm and 25mm x 2 mm respectively. The trays were kept sliding to ease replacement and to take outside. The frame of the sliding tray was made up of small wooden battens of size 30mm x 12mm having sufficient strength.

The water supply was made through the laterals of 16mm diameter for trickling the water on the wood wool layer from the top. The water tank with 3 litres capacity was used as a reservoir to fulfil the requirements of storage model. The laterals were provided with 12 microtubes through which water was circulated by gravity flow. The water holding capacity of wood wool was sufficient to cool down the inner

Table 1. : Effect of shelf-life on weight loss from fruits, vegetables and leafy vegetables.

	Storage at room temperature						Storage in evaporatory cooler					
	Weight loss, %						Weight loss, %					
Storage period (days)	2	4	6	8	10	12	2	4	6	8	10	12
Fruits												
Apple	0.7	1.2	1.8	2.8	3.8	4.6	0.3	0.3	0.6	1.0	1.3	1.6
Guava	4.2	7.7	11.5	15.5	19.7	23.2	1.3	2.4	3.2	3.9	4.5	5.1
Sweet orange	1.9	1.9	4.7	6.5	8.4	10.3	0.8	1.1	1.5	2.0	2.3	2.6
Sapota	4.3	4.3	17.4	-	-	-	2.1	4.0	6.5	10.0	-	-
Lemon	4.2	4.2	10.7	13.3	15.7	17.5	0.9	1.9	2.4	3.1	3.5	4.0
Vegetables												
Potato	0.4	0.4	1.5	2.0	2.5	3.1	0.1	0.2	0.3	0.4	0.5	0.5
Tomato	1.4	1.4	3.7	4.6	5.3	5.9	0.8	1.4	2.2	2.9	3.5	4.0
Cabbage	5.4	5.4	13.7	17.5	20.9	23.6	3.2	5.1	6.7	8.1	9.2	10.0
Cauliflower	13.1	13.1	38.2	49.1	58.6	65.8	5.4	10.6	15.9	21.3	26.4	31.2
Green chillies	13.9	13.9	32.6	38.6	43.1	48.7	6.4	12.5	17.3	21.4	25.1	28.3
Leafy vegetables												
Fenugreek	40.4	70.5	-	-	-	-	37.4	61.0	-	-	-	-
Coriander	46.4	71.9	-	-	-	-	24.1	35.3	50.0	-	-	-

guava, sweet orange, sapota and lemon could be stored for a period of 12 days with a weight loss up to 5%. Whereas weight loss of 23% was seen in the case of apple, guava, sweet orange, sapota and lemon stored at room temperature ($29\pm 1^{\circ}\text{C}$). The potatoes and tomatoes could be stored for longer periods as compared to other vegetables (cabbage, cauliflower and green chillies). However, leafy vegetables namely fenugreek and coriander could be stored for 2 to 3 days. The weight loss in case of leafy vegetables was found between 25 to 30%. This may be due to the fact that three may be dessication of the material. The leafy vegetables should be stored at high relative humidity. The household evaporative cooler extended the shelf life of vegetables by about 10 to 12 days compared to storage at room temperature.

The effect of shelf life on various physical attributes i.e. colour, appearance and texture were studied and results are shown in Table 2. The quality of the various fruits, vegetables remained nearly fresh and tough in the household evaporative cooler after storage of 10 to 12 days. However, the quality had deteriorated in terms of sprouting, rotting over maturity, black

Table 2. : Effect of shelf-life on physical attributes of fruits, vegetables and leafy vegetables

Produce	Fresh produces		After storage of 12 days			
			Storage at room temperature		Storage in evaporatory cooler	
	Colour - appearance	Texture	Colour- apperance	Texture	Colour- appearance	Texture
Fruit						
Apple	Single red	Tough	Very dark	Rotting	Slightly dark	Fresh
Guava	Water green	Tough	Dark yellow	Over matured	Slightly yellow	Matured
Sweet orange	Greenish yellow	Tough	Yellowish	Over matured	Greenish yellow	Fresh
Sapota	Mushroom	Tough	More dark	Over matured	Mushroom	Fresh
Lemon	Greenish yellow	Tough	Yellow	Black spots	Greenish yellow	Fresh
Vegetables						
Potato	Broken white	Tough	Slightly dark	Rotting	Broken white	Fresh
Tomato	Deep orange	Tough	Very dark	Extra matured	Deep orange	Fresh
Cabbage	White	Hard	Green	Slightly rotting	Greenish white	Fresh
Cauliflower	Raw Silk	Hard	Yellowish	Black spots	Raw silk	Fresh
Green chillies	New olive green	Hard	Dark in colour	Rotting	Olive green	Fresh
Leafy vegetables						
Fenugreek	Green	Fresh	Yellowish green	Wilting roosting	Green	Fresh
Coriander	Jade green	Fresh	Fruit green	Black spots & Wilting	Jade green	Fresh

atmosphere of the cooler. The seepage water distribution from wood wool was uniform.

The household evaporative cooler works on the principle of cooling of air by evaporation of water in which heat is absorbed when water evaporates, a large part of heat necessary to cause this evaporation comes from the food products (fruits and vegetables). Removal of heat cools the food materials inside the cooler keeping it at a temperature several degrees below the temperature of the surrounding environment.

Result and Discussion

The capacity of the household evaporation cooler is 25 to 30 kg. for various fruits and vegetables whereas the capacity for leafy vegetables is 5 to 6 Kg. The cost of the refrigerator is Rs. 1200/-. The maintenance cost is almost nil. The inside temperature of about 20 to 21°C was obtained with relative humidity of 85 to 90%. The atmospheric condition of air was 29.5 to 30.5°C with relative humidity of 70 to 75%.

The data on effect of shelf life on weight loss is tabulated in Table 1. It is seen from Table 1, that the fruits viz., apple,

spots etc. in case of vegetables stored at room temperature.

Conclusion

- 1) The household evaporative cooler could be effectively used for storage of fruits and vegetables at home level.
- 2) There was about 8° to 14°C temperature drop inside the cooler.
- 3) The shelf life of fruits, vegetables and leafy vegetables found were 12, 10 and 3 days respectively.
- 4) The weight loss of 5% was observed only after 10 to 12 days of storage.

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EUROPEAN FOODTRADE AND ITS GLOBAL STRUCTURES

by
Gerd Härig

ANUGA was originally founded by the Federal Association of German Retail Grocery Trade, Bonn back in 1919. In 1951 the event made its debut in Cologne. As a result, the organisers — KölnMesse GmbH and the Federal Association of the German Retail Grocery Trade — will celebrate this year the 50th anniversary and the 26th occurrence of what has now become by far the world's most important trade fair in the food industry.

The Federal Association of the German Food Industry (BVE) is the leading organisation for the food industry in Germany. Supported by its members — trade associations and companies — it represents the interests of approximately 5,500 food producers in Germany and serves as their spokesperson for economic, environmental and legal policy questions. An important focus of its activities involves helping to shape the trade fair scene for the food industry. In this capacity, the Association is also a co-sponsor of the Anuga fair in Cologne.

Where the world of food meets

The food industry requires an international meeting place where the trade, the catering sector and the industry from around the world come together — a venue where the latest products are presented and ordered, market trends can be discovered, and successful domestic and international business can be conducted. No other fair in the world is as suited to this task as is Anuga in Cologne. Once every two years, the fair demonstrates its pilot function as the universal special trade fair with well over 6,000 suppliers and more than 180,000 trade visitors from all over the world. In 2001, "Anuga Spezial" — the forum for regional specialities — will complement Anuga for the first time as a separate platform. Anuga — along with the Anuga FoodTec and the International Sweets and Biscuits Fair (ISM) — therefore makes the trade fair location Cologne the most important venue for the international food industry. The German food industry is also expecting Anuga 2001 to have a big impact on the ever-more important international markets.

The German food industry

With more than half a million employees and a turnover of DM 235.5 billion in 2000, the food industry is without a doubt one of the most important sectors in Germany. The companies are locked in intensive competition which, due to the high level of domestic market saturation, leaves very little room for further growth in turnover. Indeed, the 3.2 percent increases in turnover in 2000 was primarily due to the boom in exports. Turnover from German food products abroad increased by 10.7 percent to DM 42.8 billion according to the Federal Association of the German Food Industry. The sector generated 18.2 per cent of its turnover abroad, with 25 percent of this figure coming from outside the EU. The most important and dynamic markets for the German food industry are Central and Eastern Europe, North America and South-east Asia — from India and the

ASEAN countries to China and Japan.

The economic crises in Asia and Russia are for the most part over, and exports once again grew last year. In view of this, it is extremely important for the German food industry to maintain and improve its international competitive position.

The Federal Association of the German Food Industry believes that a further opening of agricultural markets will create opportunities for all parties to profit from an increase in total food trade under fair market conditions.

The German market for food

Asian food producers who want to offer their products in Germany must be prepared for a difficult market — as their German counterparts already know. The volume of food consumption in Germany is falling, not least because the German population is decreasing. In fact, the country's population is expected to fall by 5 million to approximately 79 million by 2002. At the same time, food spending as a proportion of total consumption has been continuously falling for years and currently lies at around 15 percent, making Germany — and the Netherlands — the countries with the lowest such proportions in the EU.

Changes in lifestyle and consumption habits are having a strong impact on the demand structure for food. The number of one-person households and working women is increasing, while the number of children per family is dropping. Many working people either cannot or do not want to cook complicated dishes when they get home from work. They are therefore in search of foods that can be prepared quickly and easily. The importance of such "convenience" products is best demonstrated by the increasing popularity that frozen foods have enjoyed over the last few decades:

in 1970, per-capita consumption of frozen foods (exclusion fresh poultry and ice cream) was 3.4 kg per year; by 1999 it had shot up to 26.6 kg — and the trend is growing.

The convenience trend is also responsible for a market shift away from traditional food retailers to the catering sector and institutional or communal catering. Germans



Gerd Härig, Chief Executive of the Federal Association of the German Retail Grocery Trade, Bonn, was in Bombay and released this report at the ANUGA press conference on 12th March 2001.

low eat out four times a week and there is a clear trend toward frequent small meals on trips, during leisure time, or just on the run during the working day. Consumers want food that is available quickly and conveniently at anytime, and which also fits into their individual daily plans. The share of spending for eating out — in whatever form — is therefore increasing and could well reach 50 percent by 2010. International foods — such as those available at the typical Turkish snack stands, to the take-away products from Asian restaurants — are also becoming more and more popular.

Although food consumption habits generally change slowly, they are in fact strongly influenced by certain fashionable trends. One of these is the demand for organic products, which is currently being strengthened by consumer uncertainty and lack of confidence about food safety and potential health risks, market volume for such products is currently around DM 5 billion. The German Ministry of Consumer Protection, Food and Agriculture considers a market share increase for "organic products" from the current level of approximately 2 percent to 20 percent in 2011 to be a real possibility. Some one-third of the turnover involved is accounted for by milk products, fruits and vegetables; grain products and meat trail far behind. Although organic products are generally sold in health food stores or through direct marketing, food retailers are now becoming a more important sales channel. Differences in price of between 30 and 100 percent compared to "conventional" products have been observed here.

Nevertheless, most consumers are unwilling to pay such a premium for "organically" produced products, particularly since "conventionally" produced food is just as safe and healthy. Food safety has always been the top priority for the food industry, which has consistently taken the necessary measures to ensure the highest safety and quality standards — from the development of the products and manufacturing processes to the procurement of raw materials, production and distribution.

The companies have observed that consumers place just as high a priority on enjoyable foods as they do on a healthy diet. There are therefore good opportunities for premium products and regional and international specialities.

The German market is also characterised by the low food prices brought about by intense price competition among food retailers. The 10 largest food retailers take in 84 percent of total turnover and put a great deal of pressure on producers to reduce prices so that they can sell to consumers at cut rates. In Germany, 30 percent of food retail turnover is already accounted for by the low-price segment. Satisfactory business results can often therefore only be achieved with well-marketed brand quality products, innovations or specialities.

The food trade between India and Germany

Germany is one of India's most important trade partner in terms of both exports and imports. Although trade relations in recent years were initially marked by strong expansion, German-Indian trade in goods fell by 4.2 percent in 1999. German food exports also fell last year. Nevertheless strong growth is once again expected to ensure now that India has a decisive policy for opening up the country's economy.

Traditional Indian export goods — such as cotton textiles and clothing (37%), leather/leather goods (15%), chemical products (13%) and foodstuff's (9%) — continue to account for more than three-quarters of all exports to Germany. India is the world's leading producer of milk, fruits and tea and the second-leading producer of vegetables, sugar and

fish. And of course, India is world-renowned for its spices.

India's food exports to Germany are therefore significant and totalled around DM 240 million in 2000. Since the last Anuga, Indian food exports to Germany have risen by 30 percent; last year alone they rose by nearly 20 percent. India exported DM 73 million worth of tea to Germany in 2000 (25 percent of total processed food export) DM 43 million in fish and processed fish product (15 percent) and DM 23 million in spices (8%). At DM 97 million, coffee was the most important export to Germany (33 percent of total processed food).

Despite its enormous production of agricultural raw materials, India is far from able to exploit that volume's overall economic potential through processing and export. Only 1.3 percent of all agricultural products harvested in India are further processed; India exported unprocessed fruit and vegetables worth DM 84 million to Germany last year.

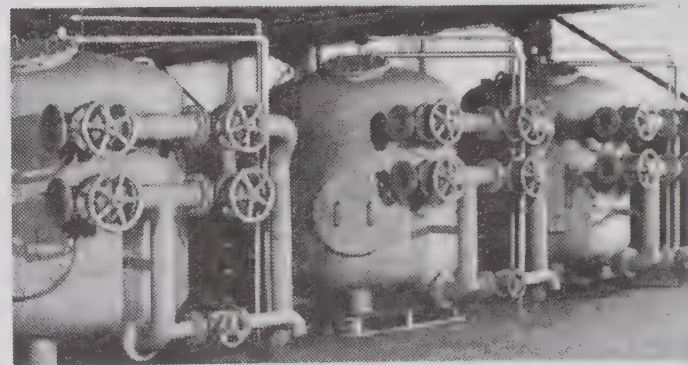
India's foodstuff sector has, however, posted impressive growth over the last few years. As one of the largest economies in the world, and one with great demand, potential for processed foods, India offers good opportunities for imports — and for investment.

The German food industry has recognised this and is currently supplying mainly vegetable oils and fat to India. These accounted for approximately two-thirds of total exports of DM 48 million in 2000. But German food producers are also interested in stepping up the trade in further processed foods as well as increasing investment in the country. In this sense, they welcome the recent relaxations on trade and investment in India.

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WTO and its Consequences on the Small and Tiny Food Industries in India

By.
Ravi Mehra

India is a large nation with more than 100 crores people or 17 crore families with about 18 to 19 crore bread-earning individuals. Out of these, about 3 crore people are serving in Government & Administratives jobs, and the rest 15 to 16 crores are self-employed or in business or are serving in business houses. Large number of these bread-earners, roughly about 95% are engaged in small scale, tiny scale & rural Industries. India does not have such large Business Houses to match the global comparatives. Most Indian companies are mostly small and family managed.

The food industry in India comprises mostly of bakeries, confectioneries, flour-mills, snack products, jams & jellies, sauces & dairy products, fresh fruits, vegetables & fruit products, sherbets and milk products. These business are at present carried out on a regional basis by very small & tiny entrepreneurs engaging 5 to 10 personnel mostly family members. The major market is domestic and not exports.

The WTO is a trade partnership in-between 162 nations. WTO is a package that also consists food laws & trade rules. The food laws of WTO are strict and have very strict legislation designed for space foods or those that are suitable only to large industries.

Our existing small, tiny & rural Industries specially the single man operated units cannot be suddenly tailored to international designs. Our units lack enough resource of space, finance, manpower, training and marketing infrastructure.

The Government, for its own reasons, without adjudging ground realities or consulting trade & Industries particularly the small, the tiny & rural has signed the WTO agreement which is destined to destroy Indian Industries.

In India, at present excise rules cannot be implemented by single-man operated units. 95% of our industries have less than one crore rupees turnover. Our small and tiny industries are on the one side burdened with multiple taxes such as the high excise tax and no setback on their inputs, high sales tax, professional tax, municipal taxes, high octroi tax, high power tariff, high freight costs & services taxes, very high interest rate on finance, and on the other hand, there is no incentive for food products as there are in so many other countries.

The WTO or its associate organization such as FAO and others have not bothered to educate and train the poorer nations on the international requirement of food. There is no programme or provision for upgradation of Indian food industry in the light of WTO applicability.

In the world trade the European Union, the USA, Canada, Japan and France enjoy 65% world market share. India has just less than 2% of the world trade share, and the contribution of food industries is quite negligible.

Food products from large nations are destined to flood in the India Market and sell at a price, lesser than manufacturing costs in India. India has 16% of world population.

Hence this market is targetted. It appears the Government has accepted and allowed its industries to be kicked by foreign industries. The present budget is a clear indication of the anti-Indian, small, tiny and rural industries design of our Government. Irresponsibly, it has not set up any study force to test and monitor and prevent the damage which is caused to our small, tiny & rural industry.

The products that are imported in India are those that are made by the small, operated units such as milk and dairy products, drinking water, sherbets, ice-cream, sweets, chocolates, jams, jellies, juices, soft drinks, liquors, bakery products, confectionery, snack foods ready to eat foods etc. Food laws are being changed in order to suit the imported products. "Caffeine" which is in the narcotic list presently, is an essential part in some branded Aerated waters. Consumers do not know this hidden fact. No label requirement is fixed for "Caffeine". The global lobby of middlemen are actively protecting the interest of their principals. Most global foods are packed with additives that are harmful. Most nations also provide large subsidies to the raw material of food products. In India, there is no direct subsidy on food. Food products in most nations are exempt from multiple taxes unlike in India. Imported sherbets are already selling in India at Rs. 20 to 30 per bottle containing 1 kg. Sugar/glucose. Imported soft drinks are selling at Rs. 3/- per 200 ml in Gaffar Market, New Delhi when the packing cost itself is Rs. 3/-. Atta is destined to sell at Rs. 2 or 3 per kg. Chocolates & Candy's are already being sold for Rs. 30 to 40 per kilo. Imported edible oil and mixtures thereof have already destroyed the domestic edible oil industry. Most food products cannot be checked for their safety and suitability to Indian health as there are no control and check points nor the equipment or the scientific data available as expressed before FAO by Food Scientists of SAARC Nations. The import of such foods in India is without the green safety signal from Indian Food Scientists, who are against the sudden opening up of the imported food gateways for health safety reason apart from the fear of destruction of the Processed Food Indian Industry.

Fruit drink manufactured by the large units such as Parle, Godrej etc. enjoy excise exemption. No sops are provided to the large number of small, tiny & rural food products manufacturer. Imported & International Branded soft drinks enjoy tax rebates in India and are now competing with the local, rural & district level food makers who cannot go in for the larger markets or obtain brands by fulfilling tiresome registration formalities. Nobody has thought of the consequences which may result in mass closure, mass unemployment, mass dependence on foreign goods, mass shift to globalization will certainly destroy the national spirit.

WTO laws make national laws infrastructurous and meaningless. Indian democracy is governed by constitution of India which is "Sovereign" and "Supreme". The "Sovereign" nature of the constitution is now superceded

without any Public and Parliament "debate" or "act". The people, the leaders, the Government heads are sleeping without realizing the inferiorisation of the constitution of India by WTO. Indian Constitution and laws framed thereunder cannot prevail upon WTO laws. This may be unacceptable to any Indian. The signing of WTO is a state policy decision directed against the Republic of India and its patriotic intent. Without amendment of the Constitution, how can the Government of India let the Constitution be superceded or set aside?

In my view, India does not need Globalisation. India needs Internationalisation of Indian products for which national upgradation programme must be launched and knocked at every door of small tiny and rural food industries. We need to make our existing industries stronger. For 5 years, if training and awareness and ungradation is conducted, then Indian products can be internationalized. At the same time our defense and representation at WTO has to be energized. At present the WTO counter in India contains 3 part time persons without a secretariat in health Ministry. Important issues at WTO are undebated by us as we are not prepared for most of the issues. WTO policy has to be tailored in such a way that small and poor nations can afford to follow. The WTO target should not be to destroy but to convert the inefficient, ineffective locals to global players with equal opportunity in world market. WTO laws must be adapted to suit India and then adopted. A full WTO secretariat must be established in India to safeguard our interest both in India as well as at WTO forums.

Existing Industries and infrastructure must be saved.

National & Regional rethinking is needed. A correct policy favourable to India is wanted. A lesson can be learned from China who has not compromised its national's Interest for Globalisation or for trade interest of the "BIG-5".

The Government can halt the invasion of the Imports, sit with the small entrepreneur and, chalk out a programme to upgrade, promote & Internationalize our own Indian Industries for whom present budget has sadly provided nothing. The present budget could therefore be amended. We could ask for incentives and provision for upgradation.

In short, urgently we must halt the invasion of imported foods as there is no infrastructure & data to check and verify food safety in conformity to international legislations and on the other hand, on a war footing, upgradating mission be launched nationwide with the help of CFTRI, CII, FICCI, CIFTI, ASSOCHAM and by televised call to all small, tiny, single man-operated units. A national movement of upgradation is necessary.

This way, the Indian small, tiny and rural Industry will become strong and shall be saved otherwise destruction of Indian Industry is destined certainly. And God Forbid such a "Tehelka" will not be sustainable for generations to come.

The statements and opinions expressed in this article are those of Mr. Ravi Mehra, Chairman, Flavours Sub-Committee, FAFAI, Mumbai. The Publishers/Editors do not necessarily share the views expressed by the Author nor do they assume any responsibility for them. — Editor.



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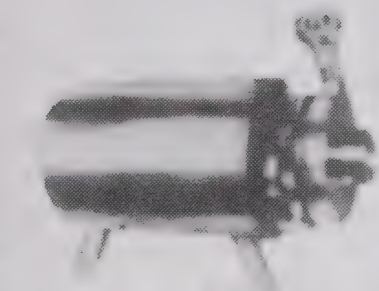
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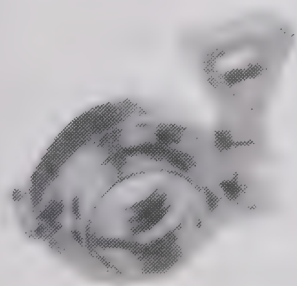
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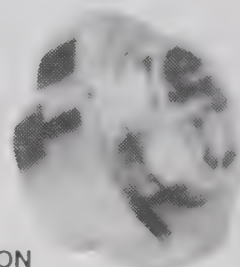
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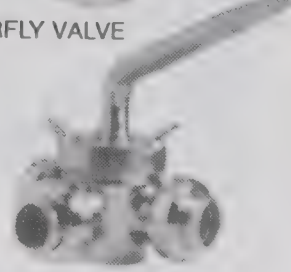
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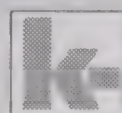
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COMPANY NEWS

PILLSBURY

US-based food company NY Pillsbury has decided to hike its stake in its joint venture with the Godrej group – Godrej Pillsbury. As per the revised agreement, Pillsbury will increase its stake to 56.5 per cent from its existing level of 51 per cent.

Apart from Pillsbury atta, Godrej Pillsbury used to distribute Godrej Food brands like Cooklite sunflower oil and Jumpin brand of fruit juices. But Godrej decided to discontinue its distribution agreement for selling Godrej brand of food products through the JV recently.

WILLIAM WRIGLEY JR CO.

William Wrigley Jr. Co. has begun rolling out a new antacid gum, the first product launched by its new health care unit, as the world's largest chewing gum company looks for new ways to spur growth.

The company is also looking at the candy business for possible expansion and had considered buying Nabisco's gum and mint business.

Facing a US gum market that is relatively flat, as well as increasing in competition, Wrigley is counting on new products to help drive growth. New prod-

uct Surpass Antacid gum was released recently in the market and the company expects it to become market leader having better distribution system globally. The company is also considering raising prices in the United States.

NESTLE

After launching Pure Milk, Nestle has now introduced another brand slim milk in the estimated Rs 125 crore UHT (Ultra high temperature treated) milk market. This is Nestle's second UHT milk brand in the country. Slim milk is a low fat milk priced at Rs 23.

Although, the milk market is a minuscule Rs 125 crore, analysts expect the market to grow at the rate of 30-40 percent per annum. The reasons for the growth in UHT milk are twofold, one, the concept of tetrapak milk has taken off, and secondly consumers are becoming increasingly health conscious.

The absence of a proper cold chain will trigger growth in this category as an unopened pack of UHT milk has a long shelf life - of between 60 and 120 days at ambient temperature.

However, the market has plenty of competition. Nestle does not only have to face competition from Amul which relaunched its tetrapak milk a year back

as Amul Taaza, there are a host of regional players also such as Aavin in Tamil Nadu, Saras in Rajasthan, Parag in UP, Verka in Punjab.

LOWENBRAU BUTTENHEIM

As the deadline of April 1st draws near for the quantitative restrictions to be lifted, one more multinational, German beer major LowenBrau Buttenheim enters the Indian beer market. The company has made an initial investment of Rs 14 crores and floated a subsidiary Lowen Brau Buttenheim India. It plans to invest Rs 45 crores later.

The maximum retail price for the LowenBrau Brand of premium lager is Rs 39 and for the super strong version, Rs 40. The company is importing raw materials at present and makes use of Mohan Rocky's Springwater Ltd's brewery at Khapoli in Maharashtra. To make the brand popular and familiar, they will also be sponsoring various events.

LowenBrau now has tough competition from established players such as United Breweries, San Miguel, Sandpiper and Australian beer major Foster's.

The Indian market is soon expected to be flooded by international foreign brands like Heineken, Budweiser, Carlsberg and the like. Industry sources

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said these players have currently adopted a wait-and-watch policy, but will make their entry when the quantitative restrictions are lifted by April 2001.

MOVENPICK FOODS

Movenpick Foods the global leader in premium food products, brings its range of premium ice-creams to India.

The products offered are manufactured following strict quality standards. Ingredients are sourced from places where they are best available viz vanilla from Madagascar, pistachios from Italy, walnuts from China, and chocolate and caramel from Switzerland. Apart from that, all the ice-creams are directly imported from its manufacturing units in Europe into the country.

The ice-creams are made from Swiss recipes with the finest natural ingredients having no artificial flavours, preservative or stabilisers. All the products are manufactured using skimmed milk, full of fruits and other ingredients which give it a rich taste.

The company, currently, is focusing more on two product lines, premium ice-cream and top quality coffee.

The company plans to invest Rs 1 crore in order to develop the infrastructure which would include development of the cold chain and distribution set-up and also support in terms of requisite equipment and enablers. It has already initiated the setting up of logistics and a cold chain with cold stores having a capacity of 11,000 cubic feet in Delhi and 47,000 cubic feet in Mumbai.

In due course Movenpick would also open its world famous ice-cream boutiques. The boutiques will serve an array of Swiss premium ice-creams, speciality coffee, assorted savouries and desserts in a classy ambience. The plans are to franchise on a regional level, starting with north India.

HINDUSTAN LEVER

Hindustan Lever owned Kwality Wall's introduces a variety of new products which includes Choco Biki Max, Cornetto Snackers, Max Doodh Badam in Cups and family packs and Kwality Wall's Sundae Tubs in combinations of Vanilla Chocolate and Strawberry.

Rather than focus on increasing its marketshare in ice-creams alone, it is looking at the entire impulse category consisting of softdrinks, biscuits and chocolates. The ice-cream market is only Rs 1,000 crore, the impulse category is more than Rs 20,000 crore. The

company claims to have a 55 percent share (Rs 330 crore) in the organised ice-cream market and (Rs 600 crore) – 30 percent share in the total ice-cream market.

By far the most interesting launch will be that of Feast Jaljeera. This year HLL would be emphasising on launching ethnic foodstuffs which are suited to Indian tastes.

The company has also decided on a change in logo. The Kwality Wall's logo in India will be replaced with the international heart logo of the company in order to maintain one common visual identity across the globe. The new heart logo epitomizes warmth, happiness and togetherness making the brand look younger and warmer than before. The company has plans to develop a high impact visibility kit to carry the new logo forward through freezer stickers, glow signs, flags, umbrellas, price-boards and other point-of-sales material.

The company is undertaking a massive brand restructuring by phasing out several of the top brands of International Bestfoods.

The brands to be de-emphasised are Captain Cook salt and atta, Skippy and Trinko soft drink concentrate, Tarla Dalal range of recipes and Glucovita Glucose D. However, leading brands from the International Bestfoods stable, like Knorr soups, Brown and Polson custard powder and Rex baking powder and jelly will be retained, as these do not directly compete with HLL's own products.

Kissan Annapurna atta has sales of around Rs 70-80 crore. Similarly, its salt brand also competes with Captian Cook salt. The company has taken a decision that Kissan Annapurna will be the flagship brand in foods, and a three-fold turnover growth to Rs 1,000 crore in another three years.

COCA COLA, INDIA

Soft drinks giant Coca-Cola India has plans for increasing volumes in the Indian Market. In line with its global strategy, it plans to transform itself from soft drinks company to a beverages company with a greater product mix. For this purpose, the company plans to sell water, tea, coffee, powder drinks and juices apart from its core brand of soft drinks.

With the advent of technology both in product development and packaging, consumers have had access to ever increasing choice of beverages. In order to expand and grow, they have made a strategic decision to offer other beverages as well.

The company has already made an entry into the water market in India through Kinley and does not rule out the option of launching another brand.

Its juice brand 'Mazaa', acquired from Parle a few years ago, is being given a major thrust. Apart from mango, it is being launched in other favours also.

In tea, the company will not look at packaged tea because there are already so many players. It could be ready-to-drink tea which is not common here.

However, soft drinks will continue to be the primary focus for Coca-Cola. In Coke, the company sees the returnable glass bottle as the key. The 200 ml bottle which retails for Rs 7 has been most popular. There is a great opportunity in take home packs. There is of course a market for cans but it is relatively slow.

Internationally, Coca-Cola is already working with FMCG companies like Nestle and P&G to develop itself into a snacks and beverages company. In both the joint ventures, the distribution and marketing strength of Coke has been integrated with research and development capabilities of the latter.

HEALTH TOTAL

Health Total a leader in health snacks has a range of products which are of high nutrition and fibre content under the brand name "Anjali Mukherjee-Diet and Health".

Health Total, snacks category includes products like nuts, jeera sticks, whole wheat bran rusk, soyabean biscuits etc. The company is targeting a sales turnover of over Rs 7 crore in the next fiscal. Its future plans include franchisee outlets in India and exports to NRI pockets like Dubai, USA, UK and Hong Kong.

Within India, Health Total has a distribution network in Mumbai, Hyderabad, Secunderabad, Delhi and Pune. It now has plans to branch out to other metros and mini metros with its health food products and weight loss programmes.

The company has its manufacturing base in Mumbai and the products are available in over 2,500 retail stores.

Health Total uses a combination of direct and indirect selling to create awareness about its services and products.

The many promotional activities that Health Total undertakes includes events, viral marketing, seminars and workshops on health, alliances and tie ups for distribution, online dissemination of information and products, creating health

awareness through articles and columns in newspapers and magazines, brochures and leaflets.

THIRUMALAI CHEMICALS LTD.

Thirumalai Chemicals Ltd. producer of phthalic anhydride (PAN) and maleic anhydride (MAN), has shifted its focus to the speciality chemicals segment.

S. Sridhar, chairman and managing director, Thirumalai Chemicals Ltd. said, "We have shifted our focus to producing PAN and MAN-based specialty chemicals such as maleic acid. But, we will continue to produce PAN and MAN."

Sridhar said the company had started production of maleic acid and tritic acid and is planning to start production of other speciality products such as HHPA and THPA soon.

Maleic acid is an ingredient in softdrinks including Coca-Cola and Pepsi.

BHARAT STARCH

BM Thapar group company, Bharat Starch, has decided to split its two main business – starch and citric acid. It will sell these units separately to group companies English India Clays and BILT Chemicals respectively.

Following the restructuring, the loss-making Bharat Starch will cease to exist in its present form.

The promoters had agreed to bring Rs 35 crore as fresh equity into the company to start operations in its 12,000 tonne citric acid plant in Baroda. The plant has been shut down for the last two

years due to the lack of resources. About Rs 60 crore was required immediately to restart operations in the plant.

WILLIAM GRANT & SONS/BACARDI MARTINI INDIA LTD.

William Grant & Sons are the leading scotch whisky manufacturers in the Highlands of Scotland. The UK based William Grant & Sons International has entered into a tie up for distribution and marketing of its famous Glenfiddish single malt whisky and Grant's blended Scotch Whisky with Bacardi Martini India Ltd. in India.

These brands have been in India for almost a century, and indeed India is one of the oldest overseas markets.

At present these brands are in very limited distribution because they are bottled in Scotland, but once QRs are removed it will be freely available in India.

Glenfiddish single malt is the world's brand leader in single malt whisky category. It is available in an age leader ranging from 12 years to 50 years. Grant's is one of the world's four largest-selling standard blended Scotch whiskies. Of the top four Scotch whiskies in the world, Grant's is the only one that is still owned 100 per cent by the family who originally founded the company.

Glenfiddish is the only Scotch whisky made in the Highlands of Scotland that is bottled only at its own distillery. Not a drop of Glenfiddish, leaves the distillery before it is safely bottled.

Since water is crucial in making great

whisky. The source of water for Glenfiddish whisky is the spring 'Robbie Dhu' on a hill. Hence it is not possible to manufacture the brand in India.

KJS INDIA PVT. LTD. / PHILIP MORRIS INDIA

TANG, The powdered soft drink from the Philip Morris India stable, has been formally launched in India.

KJS India Pvt. Ltd., a 100 percent subsidiary of Phillip Morris India, will manufacture and market Tang in India. The company is setting up a 6,000 tonne manufacturing facility in Hyderabad at a cost of about Rs 25 crore.

The facility is likely to be operational soon. The initial launch quantities, in the meantime, would be imported. The company, at a later stage, plans to launch other variants of Tang also in the domestic market which will include lemon, mango and imli flavours but no decision on this has yet been reached.

CONAGRA FOODS / AGROTECH FOODS INDIA3

ConAgra Foods, the American Food major has decided to expand into Indian staple food market via its Indian arm Agrotech Foods India.

Sometime back Agrotech launched its 'Healthy World' atta in consumer packs in north India. The atta was initially introduced in southern India, where it gained substantial volumes, nosing close to market leader Hindustan Lever's 'Kissan Annapurna' atta.

Agrotech has become a serious player

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in Indian packaged atta, edible oil and cleaned wheat markets, besides introducing imported 'fun food' brands like Act II Popcorn.

In the edible oils market, Agrotech is now the second biggest retailer of packaged RBD Palmolein under the brand name 'Real Gold', which is the cheapest oil in the market. In the premium segment, Agrotech sells tinned sunflower oil under the brand name 'Crystal'.

Real Gold, now has a total volume of 20,000 tonnes, and it caters to the lowest and biggest chunk of the edible oil market in India.

In the cleaned wheat segment, Agrotech sells 50-Kg packs which are popular with housewives, who in this case prefer to mill their wheat. "It has become a rapid-selling product in Maharashtra,". After 'atta' and edible oil it plans to enter the branded sugar market.

TATA TEA

Tata Tea the world's largest integrated company has decided to acquire tea gardens in Africa as part of its effort to synergise operations between Tata Tea and Tetley.

Tata Tea, along with Tetley, also has plans of focusing on the US, Russia, Poland and West Asia markets. In 1999, exports to Russia were to the tune of 88 million kg. For its requirements, the combine would source tea from Tata Tea's south Indian and Sri Lankan plantations. Tata Tea is eyeing a 26 percent market share in packet tea in the current financial year. Last year, the company's total production stood at 58.4 million kg which is marginally lower than previous year's 60.7 million kg.

TASTY BITE EATABLE LTD.

Pune based Tasty Bite Eatable Ltd. is a leading Indian Food Brand in US natural Food Segment. Tasty Bite Eatable Ltd., ready to eat packed food has gained a good portion of the market share after Connecticut-based Preferred Brand Inc. took over the distribution. The company is working on new packaging and product launches, some of which will be exclusively for US. The latest offering is 'Pav Bhaji' to be followed by South Indian delicacies. The company expects an export turnover of Rs 10 crores this year as against Rs 6.5 crores in the previous year.

Besides export the company is get-

ting into regional specialities to be marketed in India, it will continue to make palak paneer, dal makhant, avial, undhia and many more.

AL KABEER

The Rs 200 crore Al Kabeer group is considering of setting a Rs 10 crore seafood processing unit in Chennai.

Al Kabeer has already set up a Rs 4 crore processing facility at Hyderabad for manufacturing a range of ready-to-cook products for the domestic market.

Al Kabeer range of non-vegetarian and vegetarian products will be available in 60-70 retail outlets in each city. The limitation in the domestic market has been the lack of cold chain infrastructure. But now, with sufficient facilities available in the cities and the change in consumer habits leading to increased demand for convenience foods, the group has ventured into the markets.

Al Kabeer has over 230 products world wide, covering meat, poultry, seafood and vegetarian varieties. In India, it has launched 12 ready-to-cook products and three varieties of frozen meats. The vegetarian products include samosas, burgers and French fries. The company is planning to launch 30 more products soon.

UNITED BISCUIT GROUP

United Biscuits Group (UB) a leading biscuit company has ventured into the Indian market. Mcvities, the largest company in the UB fold, launched the Mcvities range of premium priced biscuit assortments first in South India.

The Indian partner and distributor for the Mcvities brand, Yeses Global Trading (P) Ltd., in Chennai has a distribution chain of over six superstockists, 50 distributors and over 1,500 class A outlets. With the launch in over 1,500 retail outlets, the Mcvities brand is offering discerning biscuit consumers, an authentic, imported brand that has held sway over Europe of years.

RADICO KHAITAN

Radico Khaitan manufactures rum, gin, whisky, brandy and vodka. Its Contessa rum enjoys a 25 percent market share in the defence segment, while its 8 PM whisky is claimed to be the first liquor brand in the country to cross the one-million case mark during the first year of its launch.

To boost its production, the company recently tied up with seven bottling units. These include N.V. Distilleries and Breweries of Punjab, Samrat Bottlers in Rajasthan, Deviolom Distilleries in Kerala, Satpuda Tapi P.S.S.K. of Maharashtra, Kapitan Distilleries, Rhizome Distillers and Liquor India of Andhra Pradesh.

VEEKAY FOODS

Veekay Foods and Beverages Ltd. are the importers of "Apollinaris" natural sparkling mineral water into India. Apollinaries has two subbrands Big Apple and Lemon having 60 percent apple / lemon juice and 40 percent sparkling mineral water. It is expected that the brand will replace carbonated high calories colas with its natural fizz. 750 ml Big Apple bottle will be available at Rs 99 and 1 litre Apollinaris classic Sparkling water at Rs 90.

Veekay foods is also planning to enter the food business for launching diabetic food.

PEPSICO

Soft drinks major Pepsico will invest Rs 100 crores to set up 12 plants for manufacturing its international, purified bottled water brand 'Aquafina'. The first 6 plants will be set up in Uttar Pradesh Kolkata, Maharashtra & Bangalore. The company also plans to launch one litre economy pack.

Each of the six plants, would have manufacturing capacity in the range of 160 bottles per minute.

Aquafina was PepsiCo's premium water brand across the world, but it was not priced high in India.

TROPICANA BEVERAGES

Tropicana Beverages Company, the Indian arm of Tropicana International, is expected to break even by the year 2002. The company has targeted a turnover of Rs. 80 crore by 2002-end after a modest beginning of Rs. 10 crore in 1999. The turnover increased to Rs. 30 crore last year.

The company is also looking at exports and plans to export Tropicana to Sri Lanka, Mauritius and Bangladesh. The company will also launch Tropicana in new flavours — tomato, mixed fruit and mango. It is, at present, available in orange, pineapple and grapes flavours.

Tropicana also has plan to source raw processed fruits, such as apple from Himachal Pradesh, grapes from

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| <input type="checkbox"/> JELLY MFG. PLANT | <input type="checkbox"/> EXTRACTORS / FERMENTORS |
| <input type="checkbox"/> REACTORS | <input type="checkbox"/> SIFTER |
| <input type="checkbox"/> MELTING PAN | <input type="checkbox"/> CLEAN ROOM TROLLEY |
| <input type="checkbox"/> FLUID BED DRYER | <input type="checkbox"/> STORAGE TANKS / SILOS |
| <input type="checkbox"/> MULTI PURPOSE MILL | <input type="checkbox"/> TOOTH PASTE MFG. PLANT |
| <input type="checkbox"/> MINERAL WATER PLANT | |

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tel.	: 838 0548 / 838 4173 fax : (91-22) 839 0195
email	: adamfab@vsnl.com
factory	: d-6 midc ambad nasik - 422 010
tel.	: (0253) - 382 630

Solapur and tomato from Punjab. This is significant since the company is, at present, importing the processed raw material for its products after paying an import duty of about 38 per cent.

Following the cut in excise duty, the company has reduced the prices of its one litre pack from Rs. 68 to Rs. 62 and 200 ml pack to Rs. 14 from Rs. 15.

KERALA COOPERATIVE MILK MARKETING FEDERATION (MILMA)

The dairy whitener market in Kerala is estimated to be 300 tonnes per month. Amul controls 60 percent of the market with Britannia and Nestle following, with the entry of MILMA in the dairy whitener segment the scenario has changed. MILMA invested Rs 7 crores in Alapuzha plant to add the dairy whitener to its range of products.

The technology for the plant with a capacity to process 1 lakh litres of milk per day, was procured from the National Dairy Development Board.

Milma dairy whitener was made exclusively from cow's milk. The whitener is also a versatile product since it can be used as tea whitener, coffee whitener and also to make sweet dishes like payasam.

Besides the Alapuzha plant, Milma has 9 dairy plants in Kerala and the range of products manufactured and marketed by the federation include skimmed milk powder, whole milk powder and also cattle feed. Milma is currently exporting ghee to the Gulf markets.

Milma is projecting a turnover of Rs 470 crore during the current fiscal, up from last year's turnover of Rs 438 crore, and a net profit of approximately Rs 1 crore.

Kerala's dairy consumption of milk is estimated at 65 lakh litres, of which Milma sells approximately 7 lakh litres of milk.

GOODRICKE

Tea major 'Goodricke' now ventures in retail of organic teapacks. Goodricke, has been one of the pioneers in production of organic teas.

Tea industry observes contend that India is set to face a major competition from the Chinese and Indonesian countries in the organic tea market.

Production of organic tea, which is free from any chemical fertiliser has been very low in India. The export market has stepped up with countries like Germany, Scandinavia and other European countries importing considerable amount. Since the prices of these teas will be higher than the normal orthodox varieties, a large market is not expected at the first go. But with consumers becoming environmentally conscious, its worth giving it a try.

FROMAGERIES BEL/WOERLE

The Indian cheese market a Rs. 300 crore market is all set to witness the influx of various brands of cheese from France, Denmark and Austria.

The French cheese "Laughing Cow" is the oldest brand from cheese major

Fromageries Bel. Fromageries Bel is the largest producer of processed cheese in Europe. Laughing cow will be marked by Delhi based Rai and Sons and will be priced at Rs. 45 a pack for eight triangular pieces. The Austrian Cheese brand "Happy Cow" is owned by Woerle, has entered into a licesing arrangement with Veekay Foods and Beverages in Mumbai. Happy cow product range includes varieties such a Pepper, Emmental, Ham, Paparika, Cheddar, Low fat, Cream Salmon cheese and many more.

The Indian manufacturers Britannia, Amul and Dabur are also planning to launch new products.

With the entry of new players, the focus will shift from processed cheese to speciality cheese. Industry sources claim that while the market for cheese cubes, slices and tins is growing, the flavoured cheese segment sales are declining. According to the Indian cheese manufacturers, the consumption of cheese in India is fairly low.

BRITANNIA

Biscuits major Britannia Industries will fund its in-principle agreement to acquire 49 per cent of Kwaliti Biscuits through internal accruals.

Britannia intends to keep Kwaliti Biscuits as separate company and there are no plans to merge the existing capacities of both Britannia and Kwaliti.

Britannia had earlier acquired for Rs. 30 crore the Kwaliti symbol, 'Chef symbol, and several other trademarks.

AGUAPURO EQUIPMENTS



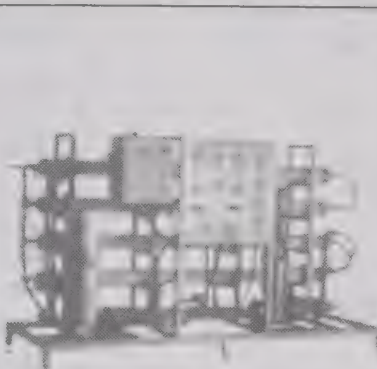
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NEWS & NOTES

'CRUNCHMETER' TO TEST CRISPNESS

Very soon the crispness of the corn-flakes and potato snacks will be tested by a 'Crunchmeter' device developed by the Scientists at Hebrew University in Behovot, Israel.

The device works on the principle of fractal geometry to gauge the crispness of the product. The device has a chamber in which the food product is placed and gradually crushed. As crushing starts the noise is picked up by the microphone and gives a graph, plotting the decibels. As a result a rugged line heaving spikes and troughs is noticed. In computer language the wriggly is known as a fractal dimension. The more wriggly a line the more it fills the plane in which it lies. If the potato chip is really crunchy, the device will make noise for a longer time. The longer the time it takes it will produce more complex curve with higher fractal numbers.

CFTRI DEVELOPS PROCESS FOR TENDERIZING LAYER CHICKEN MUSCLE

India has 200 million layer chicken population. The meat from layer chicken is tough and has limited use. Central Food Technology Research Institute, Mysore has developed a process of tenderizing the tough meat. The layer chicken meat is treated with selected chemicals under optimised conditions. The process is carried out under refrigerated system using stainless steel or plastic bins. This process can be carried out by processing units for preparing varieties of convenience products.

This meat is microbiological safe. It can be packed in polyethylene bags, frozen and then marketed. This meat require less cooking time.

KERALA PROPOSES RS. 993 CRORE TECH MISSION FOR COCONUT CROP

The Kerala government has decided to set up technology mission for the Coconut Crop. The project is estimated at Rs. 992.74, and will cover areas such

as cultivation, protection against pests and plant disease, diversification, value addition and marketing facilities of the crop.

The mission would comprise of six "mini missions" to be undertaken over a period of five years. According to official sources, the state has asked the Centre to share Rs. 501.44 crore of the total cost of the mission.

As part of its efforts to increase productivity of coconut, the Centre is implementing several programmes including production and distribution of quality planting material and integrated farming through Coconut Board.

Establishment of regional coconut nurseries and Demonstration-cum-Seed Production (DSP) farms form a part of these programmes, besides aid to registered, private and approved nurseries, removal of disease-advanced palms by providing assistance, aid to organic manure unit and control of sporadic incidents of pests and diseases through integrated pest management practices.

FEW PACKAGED WATER BRANDS CONFORM TO QUALITY STANDARDS

The escalating demand for "pure bottled water has give an opportunity to many bottlers to bottling unhygienic water. This led to the government asking the bottled water manufacturers to conform to quality standard, making Bureau of Indian Standards (BIS) mark mandatory.

The Consumer Education and Research Society (CERS), of Ahmedabad recently conducted a survey on 13 widely available pure bottled water brands from all over India.

The testing was done on three parameters viz 'analytical', 'sensory' as well as 'microbiological'. The unhealthy findings included floating particles and the presence of life endangering toxic matter. While some brands exceeded the prescribed levels of mineral and chemical content, other were conspicuous by their absence.

The test were made to gauge the residual amount of chlorine, alkalinity, chloride and calcium amongst others.

Tests according to national and international standards were also conducted on the different products.

Ten companies, including Pepsico India, Lifeline Aqua, Blue Light, Sapphire, Uma Beverages and Khodiyar Beverages in the packaged water category, and Himalayan and GC Beverage in the mineral water category, have passed the quality norms.

CUSTOM DUTY HIKE TO DISCOURAGE TEA AND COFFEE IMPORT

India is one of the largest producer of tea and coffee. Since this product is found in abundance in the country the government increased the custom duty from 35 percent to seventy percent to discourage the imports of these beverages.

In last few years imports of tea from Sri Lanka, Kenya and Indonesia has gained momentum and substantially increased. The hike of custom duty was received with great enthusiasm by local producers, though companies importing this beverage will be hard hit.

P.K. Mohan Das from the Coffee Board said "India is one of the largest producers of coffee in the world and it is hardly imported in the country. As a rare exception, there are a few importer of Brazilian coffee. This hike certainly is a great step towards protecting the domestic producers of coffee beans.

SAYING IT WITH FRUITS

Karnataka State long known as the "coffee basin" of the country is now showing a rapid rise in production of various horticulture products. It is now identified as an important market for fruits & vegetable. The reasons for the growth of horticulture products are varied. The agro-climatic conditions prevailing in the state which is conducive for the production of a variety of horticultural crops, the farming community in the state is considered to be knowledgeable and willing to experiment. The farmers have a keen sense of business acumen.

Karnataka producers varieties of fruits

like seedless grapes, acid lime, sapota, maize, figs, papaya and niger seeds. Kolar is a major production centre for mangoes, grapes, onions and tomatoes. The area under cultivation of mango in the state has gone up from 40,000 hectares in '78-79 to around 1.15 lakh hectares by '96-97'. Important varieties grown include Banganpalli, Raspuri, Malgoa and Swarna. 50 per cent of the state's mango crop comes from the three district of Bangalore-rural, Mysore and Kolar.

Karnataka accounts for less than five per cent of the national mango output. Export of mangoes brought the state a total earning of Rs. 15 lakh. In case of grapes, the state stands second only to Maharashtra in terms of production. Important varieties include Banglor Blue, Anab-e-shahi, Thomson seedless and Sharad seedles.

Pomegranate, which is often called an "exotic fruit", is popular in north Karnataka. Besides these fruits the state has also planned to focus on onion cultivation.

GOVERNMENT TO LIFT BAR ON LIQUOR LICENCE

The lifting of Quantitative Restriction from April 2001 will bring the domestic liquor manufacturers under pressure to meet the competition from foreign liquor manufacturers. In 1975, the Union Cabinet has posted a ban for creation of fresh capacity, both in existing as well as greenfield units, other than those intended for 100 per cent export (EOU's). In 1988, the ban was partially relaxed when manufacture of non-molasses-based potable alcohol, including beer was permitted.

The government is proposing to withdraw the ban on creation of additional capacity or expansion of existing capacities for distillation and brewing of molasses-based alcoholic drinks, in the light of impending influx of liquor imports in the post-QR (quantitative restriction) regime.

The withdrawal of the ban will enable domestic industry to expand, consolidate and modernise to meet the challenges of foreign liquor.

DAIRY SECTOR AGAINST CHANGE IN POLICY

The cooperative sector of dairy industry opposed any major shift in the present dairy policy which has made the country the world's largest

producer of milk.

The growth rate in milk production is more than double that of population during the past two decades.

The milk out-put is estimated to have risen from 31.6 million tonne in 1980-81 to 53.9 million tonne in 1990-91 and approximately 78.1 million tonne in 1990-2000. The per capita milk consumption has risen during the same period from 128 grams a day to around 214 grams, according to the National Cooperative Dairy Federation of India (NCDFI).

The wholesale prices of milk have remained stable, clocking the least increase compared to foodgrains, animal foods, fruits and vegetables. If the production had not increased adequately, the prices would have increased.

Higher output and organised marketing has helped generate more income for the milk producers who are by and large resource-poor landless and small farmers.

FADING SAFFRON

Saffron a member of Iridaceae family is a perennial low-growing herb. It has two varieties Mongra (first grade) and Lacha (second grade). Saffron is of medicinal value. Mongra is rich in potassium, phosphorus and traces of boron with moisture, starch sugars, crude fibre and ash. Its aroma is accredited to the volatile oils in it. The presence of riboflavin and crocin has made it the most effective colouring and flavouring agent.

Various factors are responsible for its dwindle, the unprecedented dry spell in Kashmir, pollution and disease. Besides there is a sudden growth of synthetic saffron, which is so much akin to the real that it is difficult to differentiate between the two.

UNDER-PROCESSED FOOD

The finance minister Mr. Sinha has waived the excise duty on processed vegetables, fruits and their products. This paved the way for the inflow of fresh, as well as committed, but yet to be undertaken, investment in the food processing sector. Earlier, processed food industry was burdened with 16 per cent excise duty, sales tax and other levies which labelled the industry as the highest taxed industry.

Investors response will depend on a host of other factors considered critical for a good processing unit to be

economically variable. Significant among these are the creation of infrastructure for warehousing, including refrigerated storage space for perishable goods; the unification and simplification of procedures, laws and rules applied to this sector; changes in land laws for ensuring backward linkages and contract cultivation for ensuring adequate and steady supply of raw material for processing units; and the introduction of future trading as a means of price discovery stability for foods that serve as the raw material for this industry.

Mr. Sinha's proposals apply only to processing of perishable horticultural produce. Some agro and food processing sectors have actually been adversely affected by the policy initiatives mooted in the Budget. The dairy industry feels ignored as the concessions offered to perishable foods have not been extended to spoil-prone milk and many of its products. The dairy industry, has demanded duty concession for value-added milk and milk products like infant powder, milk powder, ghee and other products, to make them cheaper for consumer. Biscuit makers, on the other hand, will now have to pay higher excise duties. Interestingly, the worst affected are the manufacturers of small packs of cheaper biscuits retailed for less than Rs. 5 per pack.

FRANKENSTEIN FOODS

One of the most serious threats posed to the future welfare of Indians is the Green agitation against Genetically Modified (GM) foods.

Any method that uses life forms to make or modify a product is biotechnology like brewing beer or making leavened bread is a "traditional" biotechnology application.

The wheat groups we rely on for much of our food supply are the result of unusual (but natural) crosses between different species of grasses. Maize is another crop that is the product of transgenic hybridization.

Thanks to the development of science over the past 150 years, we now have the insights into plant genetics and plant breeding to do what Mother Nature did herself in the past by chance.

Scientists from the Swiss Federal Institute of Technology (Zurich) and the International Rice Research Institute (Philippines) have successfully transferred genes producing beta-carotene — a precursor of vitamin A — into rice to increase the quantities of vitamin A,

iron and other micronutrients. As the GM rice produces beta-carotene, it has a bronze-orange appearance, and hence its name "golden rice". It promise to have a profound effect on the lives of millions suffering from vitamin A and iron deficiencies which leads to blindness and anaemia respectively.

The new golden rice is being distributed free of charge to public rice-breeding institutions around the world. Once the new rice is tested and adapted, millions will be able to reduce the risks of these disabling disease at little or no cost.

MILK PRODUCTS ORDER PROMULGATED

All dairy plants handling 10,000 litres of milk per day or 500 tonnes of milk solids per annum will have to obtain registration from the authorities as per the Milk and Milk Products Order, 1992.

The registration number has to be prominently displayed on the polypacks/containers. Many dairy plants were printing on their labels 'Ministry of Agriculture' or Government of India thereby misleading the consumers that the product belongs to the government. Such terms are prohibited from being printed.

The dairy owners will have to display on the pack/container the name of milk and milk product with its composition/content, complete address of the place where it has been manufactured/packed and the names and registration numbers of both, manufac-

turer and the organisation marketing the product.

INCREASE IN MILK OUTPUT

India is already the largest producer of milk in the world. It is estimated that milk production in India will be around 81 million tonnes.

To meet the growing demand for milk in urban areas, a rising number of small dairy processing facilities are being established. Increased dairy processing capacity has led to a stronger demand and higher farmgate prices for raw milk, encouraging dairy farmers to expand milk production and improve their feeding and maintenance practices.

The expansion of milk processing capacity increasing at steady pace and need to sustain fluid milk supplies during the lean season with higher prices has led to increase in milk powder production. Besides fluid milk is also used for making value added products.

ANDHRA PRADESH BIGGEST BEER MARKET IN SOUTH

Andhra Pradesh is all set to emerge as the biggest beer market, registering a growth rate of 15 percent. It is estimated that Andhra Pradesh will sell approximately 117 lakh cases of beer in the current fiscal as compared to Tamil Nadu's projected sales of 110 lakh cases. It appears that Andhra Pradesh is in the top slot, upstaging Tamil Nadu.

Maharashtra the leading beer market in the country is experiencing stagnation for quite some time. Now Andhra

Pradesh is the most sought destination for beer companies. Most multinationals are aiming for their presence in the south.

OMANI DATE EXPORTERS EYE INDIAN MARKET

India is the world's largest importer of dates. It holds vast potential for Omani date exporters. The Omani Center for Investment Promotion and Export Development (OCIPED) has launched a new initiative aimed at exposing Omani date exporters to India to be able to secure a larger slice of the prolific Indian dates market.

Indian consumption of dates was 240,000-250,000 tonnes in '99 in which wet dates accounted for about 80 per cent of the total demand, valued at around 19.5m Omani riyals.

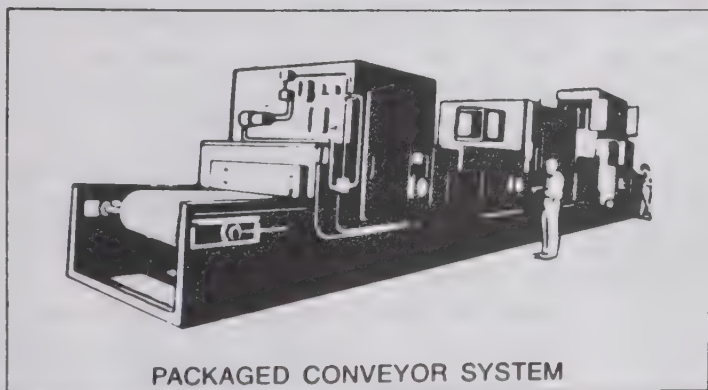
Iranian dates account for more than 90 percent of the 190,000 to 200,000 tonnes wet dates market, while Oman has a share of less than 1,000 tonnes. In the dry dates sector, Pakistan dates dominate accounting for about 80 per cent of the 50,000 to 55,000 tonnes market, with Oman just holding a 10 per cent share.

SALES TAX HOLIDAY LIKELY FOR FOOD PROCESSORS

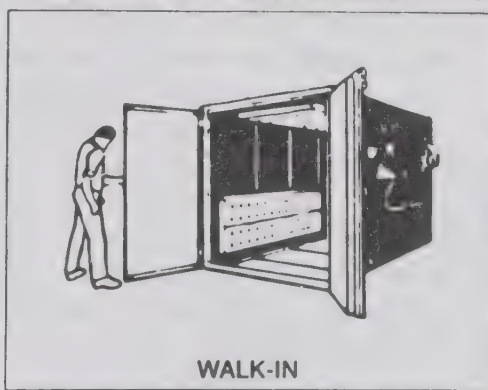
The Centre asked states to grant sales tax holiday to food processing industries to attract large investments, raise processing level from the meagre 2 percent to 10 per cent by '2010 and effectively check wastage of a large

SAKAV FOOD MACHINES

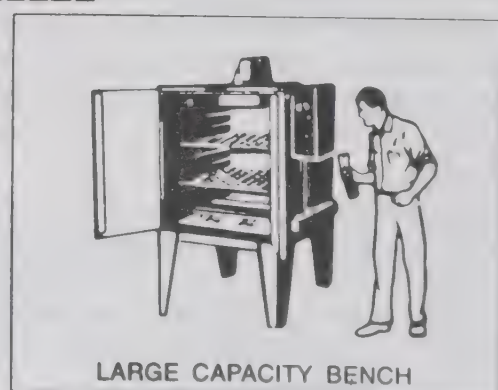
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quantity of perishables.

"Sales tax exemption to food processing industries, should be on lines of zero excise status given to them in Union budget to get Rs. 1,40,000 crore investments for the sector," agriculture minister Nitish Kumar stated at a national seminar on food processing industries.

As part of the exercise to integrate the farmers with industry and include them in the value chain, the centre is finalising the national policy for food processing industries.

SYMBOLS TO INDICATE VEG, NON-VEG FOOD ITEMS

The Union Cabinet has approved a proposal for statutory printing of symbols on labels of packed foods informing consumers whether it is vegetarian or contains non-vegetarian ingredients. While a green tree mark would indicate vegetarian food a red symbol would mean the food contained non-vegetarian ingredients.

SOFT DRINKS FIRMS TO PASS BENEFITS TO CONSUMER

Due to reduction in excise duty on soft drinks and fruit juices in the Union Budget 2001, the Rs. 5,000 crore soft drinks industry has decided to pass on the benefit to the consumer. Soft drink majors Pepsi and Coca-Cola claim that though the reduction in excise duty amounts to only around two percent, they are passing as much as between seven and ten percent price benefit to the consumer. Coke claims that its price benefit is across all pack sizes throughout the country.

GOVT. AMENDS PFA RULES

The government has amended with immediate effect the provisions under Prevention of Food Adulteration rules (PFA) 1955 relating to standards for some dairy products and for atta, maida and barley powder.

The notification spells out the limits for use of preservatives like sorbic acid and nisin in cheese and processed cheese harmonising these parameters in the standards under PFA with those prescribed internationally by Codex Alimentarius Commission.

It also removes the specifications for partly skimmed milk powder currently available under the PFA. This has been done because this product has become anachronistic with devel-

opment of adequate refrigerated storage and transportation facilities as well as processing capacities in the country.

The existing standards in PFA rules for atta, maida and suji require that they are free from uric acid, rodent hair, excreta among other things.

To further reinforce this aspect which has health implications, the PFA rules will now require that these products shall be prepared by milling, grinding grains which are clean and free from rodent hair and excreta.

In products like barley powder, the grain would need to be not only from grain that is clean and free from rodent hair but also properly dehusked. These provisions have been introduced as part of the on going exercise to ensure that consumers receive clean and wholesome food.

MOLECULAR MARKER-BASED LINKAGE MAP OF CHICKPEA DEVELOPED

Gram breeders claim to have made a significant break-through in developing the world's first molecule marker-based linkage map (genetic structure) of chickpea (gram). This will facilitate breeding new gram varieties with desirable traits.

This has been achieved by the scientists of the Patancheru (Andhra Pradesh) - based International Crops Research Institute for Semi-Arid Tropics (ICRISAT) in partnership with those of the Washington State University, USA.

The goal is to find useful genetic markers that can accelerate the progress in chickpea breeding for difficult traits like resistance to drought, insects and diseases. Stress tolerant varieties would help resource-poor farmers cope with the types of natural stresses that types could not afford to overcome because of lack of irrigation and chemical sprays. Besides, these varieties would be eco-friendly.

Gram is a major pulse crop and is one of the main sources of calories and protein for the poor in Asia and North Africa. About 90 per cent of this pulse is produced in rainfed areas. Available of plant types that can withstand aridity can be a boon to these cultivators.

Deep and numerous roots constituted a genetic trait that increased the plant's resistance to drought. Selection of plant for drought resistance would, therefore, be much easier with

the availability of the markers that could identify the genes responsible for deep and copious roots.

CASHEW'S CROWN UNDER THREAT

Cashew, king of nuts appears to have been threatened by other tree nuts. Cashew Export Promotion Council (CEPC) in Kochi recently called for a massive promotion exercise to market cashewnut and to meet challenges posed by other treenuts. Entry of new competitors in international market, decreasing availability of raw cashew nuts are some of the hurdles faced by the Indian industry.

The availability of raw cashewnuts to traditional processors and exporters like India has showed signs of a decline over the years. This is mainly because many former raw cashew producing and exporting countries have themselves turned processors and exporters of cashewnuts.

The cashew congress, recently held at Kochi brought together the major cashew nut producing countries and served as a platform for exchange of production techniques, farming practices and other knowhow.

The congress highlighted the recent decline in the consumption of cashew. Cashewnut is today used mainly as a snack food. However, the use of cashewnut as a food ingredient along with several other major food items was discussed. The myth that cashewnut is something that will affect the health of an individual adversely was effectively exploded during the course of the congress.

CANADA EYES JVS IN FOOD PRODUCTS

Canada is the world's largest exporter of peas, lentils and chickpeas and fourth largest of beans and is the single largest supplier of peas and pulses to India.

The country has sent Pulse Canada, a delegation of pulse growers & specialists to review with Indian counterpart — the Indian Agriculture Research Institute and the Central Food Technologies Research Institute — quality assessment methods and standards for pulses.

They will study the development of new varieties of pulses suitable for value-added food market which is rapidly growing in India.

The Pulses Importer's Association here has urged the Union finance minis-

ter to immediately reconsider his decision to impose five per cent customs duty on pulses. The pulse production in the country has gone down and this import duty will result in higher prices for the consumers.

FOOD PROCESSING SECTOR'S TARGET IS 15.4 LAKH TONNE

The Union Budget has given the Food Processing industry complete exemption from excise duty. The industry decided to increase the annual production capacity to 15.4 lakh tonnes from the present 9 lakh tonnes in the next fiscal.

The food processing industry has planned to take a slew of measures including low cost packaging material, own retail channels, better technology and trained manpower to achieve capacity utilisation of 70 per cent in 2001-02."

NEW PFA RULES ON MINERAL WATER

According to an amendment to the Prevention of Food Adulteration Act (PFA), 1954, water is now classified as food. The amended rules will come into force from March 29, 2001.

According to the amended rules mineral water includes all kinds of mineral water or natural mineral water by whatever name it is called. It should be sold under Bureau of Indian Standard (BIS) Certification mark.

Natural mineral water contains mineral salts in various relative propor-

tions and trace elements.

The Government Order also distinguishes between carbonated and uncarbonated mineral water; prescribes conditions for packaging mineral water and strictly prohibits carrying water in bulk containers from its source to distant packaging units.

The source of the mineral water should be protected against pollution and contamination.

The standards laid down are very rigid. The manufacturer is expected to test the mineral water at the source and, if it is found polluted or contaminated, he should take corrective steps before resuming operations. The optimum and minimum levels of salts and trace elements are also prescribed.

The amendment also specifies standards for packing and selling ordinary potable water. Companies are required to print, 'packaged drinking water' in bold letters enclosed in a box. Packaged drinking water has been defined as water derived from any source of potable water and subjected to treatments such as decantation, filtration, demineralisation, re-mineralisation and reverse osmosis before being packed. It may be disinfected using chemical agents and/or other physical methods, taking care not to alter its natural composition. It shall be packed in clean, sterile, colourless and transparent tamper-proof bottles and containers made of polyethylene, conforming to IS:10146 or Polyvinyl chloride, conforming to IS: 10151 or polyethylene terephthalate conforming to IS:12252 or polypropylene, con-

forming to IS: 10910 or food-grade polycarbonate or sterile glass bottles

EGYPT BANS INDIAN MEAT, EXPORTS TO FALL BY HALF

Meat exports of India has reduced to half after Egypt, its biggest single customer, banned Indian imports for fear of the spread of foot-and-mouth disease.

Saudi Arabia has also suspended Indian imports and Jordan is considering similar measures.

Outbreak of the disease, which has appeared sporadically in the country despite efforts to eradicate it, have been reported in the states of Haryana and Rajasthan.

The Indian industry, which exports 30,000 tonne of meat and meat products each month and is worth an estimated Rs. 1,000 crore (\$214m) annually, is expecting volumes to fall to less than 15,000 tonne following the ban.

Egypt imports 14,000 tonne of Indian meat and meat products each month mainly of buffalo.

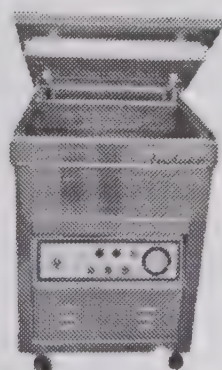
The Indian Agricultural and Processed Food Products Export Development Authority, the government body responsible for the industry, is sending a delegation to Egypt to try to reverse the ban set to last until April 28.

"The Egyptian government is in the process of reviewing their existing protocols for imports," said Irfan Allana, president of the All India Meat and Livestock Exporters' Association.

The buffalo products are de-boned and de-glanded and kept at a pH level of less than six, so they are entirely risk free.

Indvac RANGE OF PACKAGING MACHINERIES

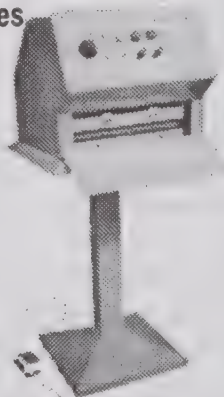
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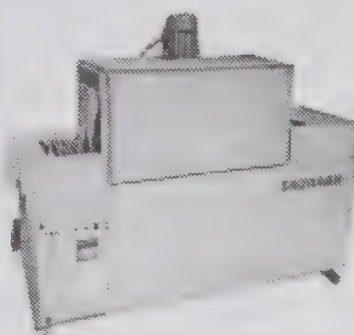
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FOREIGN SCOTCH WILL FLOW FROM LOCAL SHELVES AFTER APRIL

A major consolidation in the liquor industry is in the offing, with more foreign companies tying do with existing players for marketing their brands in India. The industry will witness a lot of activity with more brands vying for shelf space using new marketing techniques, more freebies more fashion shows and concerts.

Industry experts said at 222.4 per cent customs duty, the domestic industry has nothing to worry about. The highest priced Indian Made Foreign Liquor (IMFL) does not exceed Rs. 450 and scotch cannot meet these prices at current levels of customs duty. However the competition will begin only after customs duties are slashed to 150 per cent from the current levels.

Various foreign companies which have no operations in India at present are entering into marketing arrangements with existing liquor companies for selling and marketing their range of alcoholic beverages.

JBB Greater Europe is planning to relaunch Findlaters bottled in Scotland, Old Mull Scotch and Whyte and McKay Special reserve, via government-owned marketing cooperatives in Tamil Nadu, Kerala, Andhra Pradesh and Delhi to sell and market their brands.

A newcomer Douglas Laing and Company is planning to bring in John Player Special scotch via Radico Khaitan and BDA Distilleries to market its products. A liquor company, Ian Macieod and Company, has plans to launch Isle of Sky, a 12-year-old scotch, King Robert regular scotch and Royal Scot whisky, it has tied up with National Industries Corporation to market its products.

Radico Khaitan has entered into a marketing arrangement with Ernst and Juilo Gallo, a major wine manufacturer, to markets its portfolio of wines, UDV will bring Johnny Walker, Black Label and Red Labels. Pernod Ricard will launch Campbell from its umbrella of brands and another scotch company, Highland Distilleries, will launch Famous Grouse.

LIQUOR IMPORTS TO CARRY 150% BASIC DUTY

The policy on liquor imports is finally clear. As per guidelines issued by the Director General Foreign Trade (DGFT), bottled imports which are on the open general licence (OGL) will attract a basic customs duty of 150 per cent. The

government has also levied a three-tier graded additional customs duty on liquor imports.

As per the stipulation, a case worth \$20 or less will have to pay an additional customs duty of 150 per cent, cases costing between \$20-\$40 will have to pay an additional duty of 100 per cent and cases more than \$40 will attract a 75 per cent additional duty. The three effective rates of duty will thus be 300 per cent, 250 per cent and 225 per cent, respectively.

Bottled liquor imports were earlier on the negative list but alcoholic concentrates could be imported at a duty of 224 per cent. The import restriction was removed in keeping with the government's commitment to the World Trade Organisation to phase out quantitative restrictions.

IMPORTED FOOD MUST COMPLY WITH INDIAN LAWS

The trade barriers are moved, a deluge of imported food stuff have hit the Indian shores. But a sample study shows, there is more food for thought as a host of these are found to be adulterated, unpalatable and containing information on the packs in languages not understood by the local consumers.

These have led to gross violation of consumer rights in terms of both quality of food and pricing.

The government on its part, is now contemplating action, besides directing importers to provide all details in locally understood language. In future, importers will be asked to give an undertaking at the time of imports that they would comply with the provisions of the Packaged Commodity Rules and obtain a certificate from the foreign exporters that the products meet the requirements of quality prescribed by the Indian food laws.

A recent study undertaken by a consumer group, VOICE under the aegis of the department of Food Processing Industries, showed that 22 per cent of a sample size of 457 food items, were found to be containing non-permitted colours, flavours and vegetable fats and not giving a separate declaration on the package as required under the provisions of the law of the land. About 81 per cent of the items did not have any information on the name and description of food contained, names and composition of the ingredients used and the complete address of the manufacturer or import-

ers or vendor of the goods.

"This is in complete violation of the Rule 32 of the Prevention of Food Adulteration Act which states that 'every package of food shall carry a label and unless otherwise provided in these rules, there shall be specified on every label the trade name or description of food contained in the package, the names of the ingredients used in the product in descending order of their composition by weight or volume as the case may be,' an official said.

Official sources added that the ministry was planning on taking some action against the importers to check unlawful imports.

They added that there were various products where the language used in the packaging was foreign, say Arabic, which is not understood by a majority of Indian consumers.

Around 65 per cent of the sample did not have any MRP written on them, leaving the buyers at the risk of paying more to the retailer or the distributor.

PRODUCTION TECHNOLOGY FOR FRUIT BASED CARBONATED DRINKS AND BEVERAGES.

The Indian Agricultural Research Institute — New Delhi is having Entrepreneurship Training Program on "Production Technology for Fruit Based Carbonated Drinks and Beverages from 14th to 28th May 2001 at PHT Unit, Division of Fruits and Horticulture Technology IARI, New Delhi 110 012

The Objectives of the training programme is

- 1 To acquaint the public/participants with IARI developed technology for the production of fruit based carbonated drinks and beverages.
- 2 To train manpower
- 3 Improve the skills of the existing fruit drink manufacture.

This training is for the benefits of R&D Institutes, NGO's Cooperatives Farmers, Entrepreneurs and for those who are engaged in manufacturing fruit juices and beverages. Individuals/sponsored candidates can participate in this programme.

For further information contact:

Dr. D.S. Khurdiya, Principal Director & Course Director, Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute New Delhi - 110 012.
Tel: 5788428/5785214

EXPORT HIGHLIGHTS

GRAPES

Grapes exports in Andhra Pradesh is set to go up by almost 40 per cent over the last year's exports volume of around 300 metric tonnes.

Export markets for grapes are more encouraging this year than what they were last year. The rise in export demand follows an increase of almost 500 acres this year in the grape growing areas in the state to around 10,500 acres. While the Telangana districts of Ranga Reddy, Medak and Mahaboobnagar account for more than 7,500 acres, the remaining areas are located in the two Rayalaseema districts of Chittoor and Ananthapur.

The total production in the state this year is expected to be around 75,000 metric tonnes as against 70,000 metric tonnes of the past year. The exports are currently directed towards the Gulf markets and subsequently they will be towards UK and other European countries.

The rise in demand from overseas buyers is mainly due to the improvement in quality and also due to pre-and post-harvest management techniques employed by the growers.

COCONUT

The Coconut Development Board (CDB) under the ministry of agricultural, is targeting exports worth Rs. 400 crore by the end of the current fiscal against last year's Rs. 313 crore.

The coconut sector contributes nearly Rs. 7,000 crore to the gross domestic product. According to the latest statistics, India tops the world in coconut production with the highest per hectare productivity of 7822 units. India has 19.4 lakh hectares of area under coconut cultivation producing 14.925 million units

per annum.

"The Indian market is slowly witnessing branded coconut products like aerated coconut water, coconut milk, dessicated coconut, coconut milk concentrate, tender coconut pulp jam and others" the CDB chairman Mr. P. Rethinan stated. There is a growing market for such products in West Asia and Europe to target and in this regard the Coconut Development Board is providing adequate subsidies and technological support to the sector.

CDB, is now set to focus more on the copra or milling coconut which accounts for 35 to 40 per cent of the earnings.

Technologies have been developed to manufacture coconut cream, spray dried coconut milk powder, coconut water based vinegar and packed tender coconut water under sponsored projects of the Board and a few units have been established in the private sector utilising the technologies developed by CDB." Rethinan said.

WHEAT

In a bid to further liberalise food-grain exports, the government has decided to allow the export of wheat products as well.

Export orders for nearly 1.2 to 1.3 million tonne have already been bagged and partly executed as well. The latest large order was from Russia for the purchase of 0.5 million tonne of wheat. Iraq had entered into an agreement to buy 3.5 million tonne of Indian wheat under the food-for-oil programme sanctioned by the United Nations.

Due to lower prices, Indian wheat is finding market in West Asia, Bangladesh, South Korea and Philippines as well. While Bangladesh and the West Asian countries are buying this wheat

for milling for human consumption, Korea and Philippines are doing so for converting it into animal feed.

Food ministry feels that value-added wheat products would also have good market. Maida is, in any case, in demand in the international market. Some of the processed products, including pasta products, can also have a market.

Krishi Bhawan is anxious to sell as much wheat and wheat products abroad as possible to vacate storage space for the next wheat crop expected soon.

APPLES

Jammu and Kashmir produces 9,95,000 tonne of apple annually, which is 62 percent of the total national production of 1.5 million tonnes a year. Himachal Pradesh produces 4,00,000 tonnes followed by Uttar Pradesh with 1,70,000 tonnes.

The Kashmir apples of different varieties are exported to Sri Lanka and Bangladesh. About 3,42,000 tonnes of apples were exported as compared to 9,02,000 the previous year.

SPICES

Exports of value-added spice products which stood at Rs 358.19 crore in 1997-98, jumped to Rs. 459.26 crore in 1998-99 and in 1999-2000 it was around Rs. 470 crore. For the six months of this fiscal, it has touched Rs. 264.26 crore and is expected to surpass the 1999-2000 figure to touch the Rs. 500 crore plus mark.

Export of spice oleoresins started way back in 1971-72. Around three tonnes of the product were exported then and fetched Rs. 1.41 lakh and in 98-99 touched 2,750 tonnes to fetch over Rs. 300 crore.

WE INVITE EDITORIAL CONTRIBUTIONS

If your technical/marketing personnel wishes to contribute an Article or Technical paper relating to Food & Beverage processing, we would be happy to publish it. The Articles should be of a general nature, not specially promoting products of your company.

If your paper/article does not have any diagrams you may send it to us by Email or an Floppy set to MS word or PageMaker 5.0

Write to:

The Editor, Beverage & Food World

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BOOK REVIEWS

BREAKFAST CEREALS and how they are made —Edited by Robert B. Fast and Elwood F. Caldwell. Published by AACC, 3340 Pilot Knob Road, St. Paul, MN 55121-2077, USA. Tel: 1-651-454-7250, Fax: 1-651-454-0766, Email: aacc@scisoc.org, Pages 562, Price \$ 139, Second Edition.

Breakfast Cereals and How They are Made, 2nd Edition fulfills the need for updated and new breakfast cereal information generated by the increased importance and consumption of breakfast cereals worldwide.

All the chapters in this book have been updated or significantly revised. Information on contemporary topics such as new developments in equipment and technology, the expansion of computer control within the industry, advances in nutritional knowledge, and environmental issues in breakfast cereal manufacturing have been added.

The novice or seasoned professional working in product development, process engineering, technical sales, nutrition, sensory analysis, packaging, or quality assurance is sure to benefit from the in-depth information presented in *Breakfast Cereals and How They Are Made, 2nd Edition*.

Includes advances to help boost productivity and improve product quality. • New developments in equipment and technology • Advances in nutritional findings • Improved attention to starch as a polymer and its processing characteristics as they affect tem-

pering, preconditioning and flaking • Enhanced international coverage of process equipment • Increased detailed treatment of automation and computer control in processing • Expanded practical and regulatory information on environmental issues • Enlarged listing of manufacturers of processing and packaging equipment • Expanded and updated list of additional references.

The topics covered are The Cereal Grains • Manufacturing Technology of Ready-to-Eat Cereals • Unit Operations and Equipment I. Blending and Cooking • Unit Operation and Equipment II. Drying and Dryers • Unit Operations and Equipment III. Tempering, Flaking and Toasting • Unit Operations and Equipment IV Extrusion and Extruders • Application of Nutritional and Flavouring/ Sweetening Coatings • Hot Cereals • Packaging of Breakfast Cereals and Machinery • Fortification and Preservation of Cereals • Cereal Nutrition • Quality in Breakfast Cereals • Computer Control in the Breakfast Cereal Industry • Environmental Issues in Breakfast Cereal Manufacture

The Economics of HACCP: Costs and Benefits Edited by Laurian J. Unnevehr. Published by AACC 3340 Pilot Knob Road, St. Paul, MN 55121-2097, USA. Tel: 1-651-454-7250, Fax: 1-651-454-0766, Email: aacc@scisoc.org. 412 Pages. Price \$ 99.

The Economics of HACCP: Costs and Benefits assesses the cost effec-

tiveness of the Hazard Analysis Critical Control Point (HACCP) system for improving food safety. The HACCP system is widely used in the food industry and has been mandated by U.S. federal regulation, and by many other industrialized nations for several sectors of the food industry. This book explains the impact of HACCP on food markets, food companies, and consumers worldwide.

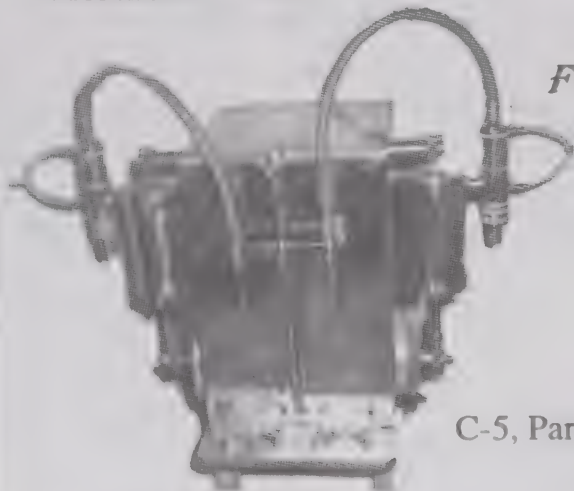
Any one using HACCP or implementing a HACCP program will benefit by reading this book. Case studies and real-world examples provide information about how to operate a successful cost-effective HACCP program.

This book demonstrates the extent and importance of HACCP in the food industry. It includes international comparisons of HACCP implementation and its use in different parts of the food production chain. By including studies on the economic costs-benefits of HACCP, this volume investigates why the food industry is adopting HACCP. Presenting the first studies of the U.S. experience with HACCP, this book provides a complete understanding of the impact of mandating HACCP through government regulation.

This new title is based on "The Economics of HACCP" conference held in Washington, D.C. It is an essential assessment tool for agricultural and consumer economists, microbiologists, consultants and food industry professionals in quality assurance, research and developments and management.

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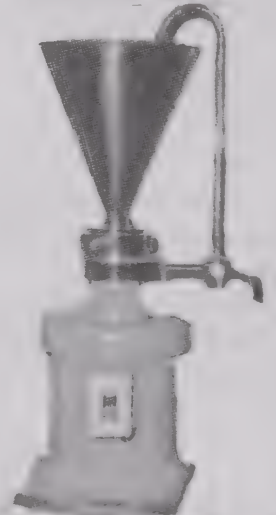
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TRADE FAIRS & CONFERENCES

BANGALORE BIO.COM 2001

Venue: Bangalore

Date: 15-17 April, 2001

BIO.COM 2001 is organized by the Vision Group on Biotechnology appointed by the Government of Karnataka and co-organized and produced by Trade Fairs & Conferences International (TFCI), a leader in organizing niche technology trade shows and conferences. Together, they bring a world of opportunity at the epicenter of all biotech activity.

Bangalore BIO.COM 2001 Conference comprises of distinguished speakers from various segments of the biotechnology industry covering genomics, bioinformatics, gene therapy, cell therapy, cancer biology, novel therapeutics, neurosciences, proteomics, intellectual property, regulatory issues, public policy, marketing, merges and acquisitions, ethics, public relations and human resources.

This event, held at Palace Grounds, is an opportunity to showcase and promote the latest biotechnology products, technologies, equipment and services to the Indian Biotechnology Industry and its support organizations across the globe.

For more details contact:

Trade Fairs & Conferences International B-309, Hind Saurashtra Indl. Estate, M.V. Road, Andheri (East), Mumbai 400 059. Tel: 91-22-8594057/8/9, Fax: 91-22-8594060. Email: tfci@tfci.com

GLOBAL FOOD TECH 2001 AND GLOBAL EXPO 2001

Venue: Goregaon, Mumbai

Date: 19-23 April, 2001

The Global Food Tech 2001 and Global Expo 2001 together aim to bring product and technology from all over the world under one roof. This mega event will make available the different sources of information of the latest development of technology in the field of Food Technology, Refrigeration, Office automation, Electronics, Consumer goods and Consumer durables, Packing and Marketing techniques and also reveal India's

development in various fields.

Global Food Tech 2001 is an event dedicated to the latest product innovations in the food and drink industry, and will be Mumbai's event of international repute with more than 300 exhibitors from entire food and beverages, hotel technology, dairy industry. Food Tech 2001 is designed to provide a unique marketing opportunity.

Exhibitor Profile: • Processed Foods • Dairy products • Beverages • Breweries and wine • Fresh Frozen Foods • Ice cream and desserts • Seafood • Confectionery • Spices • Bakery products • Canned foods • Food Processing Machinery and Equipment • Packing Material • Dairy Machinery and Equipment • Canteen Equipment • Beverage / Soft drinks • Printing • Labelling / Marking • Wrapping Machinery • Canning Technology • Food ingredients / Additives • Storage systems • Refrigeration / Freezing • Equipments • Bottling Technology • Instrumentation, Testing • Quality control • Liquid handling • Waste / Water Treatment • Measurement and Weighing • Process control Technology • Agricultural supplies.

Global Food Tech 2001 Conference to run concurrently has been drafted with the intent to provide valuable insight into the development in the food industry, to study the past market trend, analyse and forecast accurately future trends, and make available critical information on technologies strategies for successful implementation of plans.

For details, please contact:

Global Foundation, 12/260 Samudradarshan Co-operative Society, D.N. Nagar, Andheri (W), Mumbai 400 053. Tel: 6235154, Tel/Fax: 623 5153, Email: globalf@hotmail.com / eglobalexpo@hotmail.com, Website: eglobalfoundation.org

FOOD EXPO 2001

Venue: Bangalore

Date: 28th April - 2nd May, 2001

India, the second largest food producer in the world, has the potential to become the largest producer in the world. There has been a steady growth in the

food processing sector during the last decade, its full potentiality is yet to be exploited for it to become one of the key players in the domestic and international markets.

Marketing of foods and processed food products has assured paramount importance in food business. With this in view, Centre for Processed Foods have associated with M/s. Enterprising Exhibitions in promoting marketing opportunities and boost market related activities in food business by organising **Food Expo-2001.**

Display Category: Food Products including Processed Foods, Sea Foods, Spices, Cereals, Edible Oils, Pickles, Chutneys, Cashewnuts/Kernels * Beverages (excluding alcoholic drinks) - Mineral water, Soft Drinks * Frozen Foods & Herbal Products * Bakery, Confectionery and Dairy Products * Fruits & Fruit juices, Raw Materials, Ingredients & Additives * Food Processing, Packing and Coding Machinery * Milling Machinery & Equipment * Dairy, Bakery and Confectionery Equipment and Machinery * Cold Storage, Air Conditioning and Refrigeration Equipment * Air and Water Pollution Control Equipment * Hotel and Kitchen Equipment, Table-ware * Health and Fitness equipment * Associations, Research Institutes & Export Promotion Councils * Service Providers/Consultancy Services * Miscellaneous products related to food industry.

For more details contact:

Enterprising Exhibitions, HRK Bldg., 8th Main, 9th Cross, Shivanagar, Rajajinagar, Bangalore - 560 010, Karnataka. Tel: 3357758, Fax: 080-3324338, Email: foodexpo2001@yahoo.com

VICTAM EUROPE 2001

Venue: Utrecht, The Netherlands

Date: 24-26 April, 2001

The new millennium will witness for the first time on event that lays emphasis on animal feed and aqua feed. Organised by Hank Van de Bant, Victam Europe 2001 will present a series of conferences on Scientific and Technical know how on new ingredients and applications to ensure effi-

ciency of production, safety & quality of meat, fish, milk and egg products.

The theme of the scientific and technical papers will be "new ingredients and applications to ensure efficiency of production, safety and quality of meat, fish, milk and egg products". Experts will provide guidance and facilitate an exchange of information, ideas and views on the most important issues facing the animal and aquatic feed industries today. It will appeal to all those concerned with feed formulation nutrition, health, feed and food safety, as well as, economic and environmental feed production.

For more details contact:

Victam International BV., P.O.Box: 197, 3860 Ad Nijkerk, The Netherlands. Tel: ++31-0-33 246 4404, Fax: ++31-0-33 246 4706. Email: expo@victam.com Website: www.victam.com

SIAB

**Venue: Verona, Italy
Date: 14-16 May, 2001**

SIAB The International Bakery, Pastry, Fresh Pasta and Pizza show is back once again for the sixth time in Italy. This international event is all set to have a far reaching impact. The exhibition will present the latest news in the production of ovens, equipments, raw materials, furnishing for bakery, pastry, confectionery, fresh pasta and pizza. It will welcome all operatives from bakery, pastry, confectionery, fresh pasta and pizza industries. The wizardry of craftsmanship and the ultimate in high-tech ground breaking, will turn the five-day show into a major event.

Exhibit profile • Machinery • Oven appliances • Equipment • raw material semi-product • Mines • Furnishing and accessories for pizza production, alongside the areas devoted to bakery, pastry confectionery and fresh pasta.

For more details contact:

Organizing Secretariat, Prom-expo Sri, Via Caldera 21/C 20153 Milan - Italy. Tel: 39-02-40922501, Fax: 39-02-40922550, Email: info@fiere mostre.it

SIAL ASIA

**Venue: Singapore
Date: 5-8 June, 2001**

The world's most renowned food and beverage show Sial Asia once again returns to Singapore after a span of two years. It will provide a highly sophisticated showcases for the latest food and beverage products from all over the world. Among the countries represented at SIAL ASIA 2001 are the national

pavilions of Australia, Egypt, France, Indonesia, Italy, Malaysia, Spain and USA and an impressive line-up of leading food and beverage manufacturers and suppliers from the region.

Besides the exhibition, Sial Asia 2001 will be conducting a number of seminars to create an awareness in food safety and loss prevention measures for retailing in food industry. The seminar is co-organised by CIES, an organisation that represents 250 major food retailing and distribution companies from 48 countries worldwide.

Sial Asia will also feature special TEA PAVILION that promotes the philosophy, cultures and art of tea drinking, with a showcases of teas from all over the world.

The HEALTH TREND SHOWCASE will reflect new trends in the manufacturing of natural and health food worldwide. Food manufacturers from all over the world are expected to participate in this interesting showcase which will feature four categories of healthy foods. They include nutrient modified and nutrient enhanced food products, food with special health ingredients, natural and organic foods as well as dietetic products that are specially formulated for infants, children, the elderly and patients with special needs.

Exhibit profile: Alcoholic Beverages • Children's Food & Health Food • Convenience Food • Cured Meats • Dairy Products, Eggs • Delicatessen Products • Food Ingredient • Fresh & Semi-Preserved Fish, Molluscs & Shellfish • Fresh Fruit & Vegetables, Dried Fruit • Fresh Meat & Offal • Fresh Poultry & Game • Frozen Food • Grocery Products (Including Pulses & Pasta) • Halal Food • Horticulture • Non-Alcoholic Beverages • Organic Products • Pet Food • Private Labels • Product for the Catering Sector • Professional Services & Federations • Tinned Products & Other Preserved Products.

For more details contact:

Ms. Angeline TOK, Exhibition Manager, SIAL ASIA PTE LTD., 20 Kallang Ave., 2nd Floor, Pico Creative Centre, Singapore 339411. Tel: 65-3929269, Fax: 65-3929260, Email: kctok@pacific.net.sg.

BEER 2001

**Venue: Brussels, Belgium
Date: 13-15 June, 2001**

Organised by Brussels Fairs and Exhibitions and supported by confederation of Belgium Breweries Beer 2001. Beer is a biennial, unique trade fair that will bring together beer professionals from around the world in one place to do

business. This is a business-to-business event only, aimed exclusively at manufacturers and distributors of beer: brewers, importers, exporters, national and international buyers as well as various industry federations, government and European Union officials.

It is a place where the focus lies on export, sales and distribution on a worldwide scale. This truly international event will reunite high level management, marketing and sales executive from breweries worldwide and bring them together with the most important players in the distribution chain: importers, exporter, distribution managers, purchasers from major catering, airline and hotel groups.

Exhibitors : • International breweries • National brewers • Regional brewers • Family brewers • Microbreweries.

A total of 250 exhibitors are expected. More than 4,000 industry professionals are expected to attend this trade fair.

For more details contact:

BEER 2001, Brussels Fair & Exhibitions Place de Belgique, B-1020 Brussels, Belgium. Tel: +32 2 474 8538, Fax: +32 2 474 8540, Email: beer@bitf.be

SEAFOOD CHINA EXPO 2001

**Venue: Kowloon, China
Date: 14-17 June, 2001**

Organised by Dalian Municipal People's Government, China Society of Fisheries, and Business and Industrial Trade Fairs Ltd. and co-organised by Dalian Bureau of Aquatic Products of China, Dalian Xinghai Convention & Exhibition Centre, and Business & Industrial Trade Fairs Ltd., Seafood China Expo promises to be very impressive and effective in paving the business road to China.

The Chinese government's enthusiastic encouragement on marine environmental protection and aquaculture technological development gives reliable guarantee aquaculture development. With the keen participation of China Society of Fisheries, Seafood China Expo 2001 offers the best path for newcomers to explore the China seafood market and for the existing businessmen to expand their business scale.

Seafood China Expo opens up the gateway for seafood industries to source new seafood products, find new market, and meet international suppliers and buyers in the potential lucrative China seafood market.

Exhibitor Profile: Seafood, Seafood Processing, Packaging, Storage Equipments, Aquaculture Equipment

FOOD EXPO - 2001

National Exposition on Food, Food Processing and Packaging Industry

Date : 28th April to 2nd May, 2001

Venue : PALACE GROUNDS, BANGALORE

Co-Sponsored by : GOVERNMENT OF KARNATAKA
Supported by : CENTRE FOR PROCESSED FOODS

Show casing latest technologies in food processing, refrigeration, packing, handling, storing and food products

DISPLAY PROFILE:



Equipment & Systems : ♦ Food Processing ♦ Storage & Handling ♦ Packaging ♦ Aseptic Facilities ♦ Refrigeration ♦ Bakery ♦ Confectionary ♦ Dairy ♦ Cold Storage ♦ Air and Water Pollution Control ♦ Hotel & Kitchen ♦ Health & Fitness.



Food Products : Processed & Frozen Foods ♦ Spices ♦ Sea Foods ♦ Cereals ♦ Edible Oils ♦ Confectionery ♦ Packaged Foods ♦ Additives & Preservatives ♦ Health Foods ♦ Herble Products ♦ Beverages ♦ Poultry ♦ Dairy Products ♦ Bakery ♦ Fruits & Fruit Juices ♦ Mineral Water ♦ Soft Drinks ♦ Beverages (Exculding Alcoholic Drinks).



Others : Research Institutions ♦ Export Promotion Councils ♦ Consultancy Services ♦ Service Providers ♦ Associations / Trade Promotional Bodies.

The fair will also help the participants in achieving inter alia;

- | | |
|-----------------------|--|
| a) Market Penetration | e) Vendor Creation & Outsourcing opportunities |
| b) Market Improvement | f) Image / Brand building |
| c) Product Promotion | g) Networking in various aspects in developing the business. |
| d) Sales Promotion | h) Understanding the competition. |

For further details please contact:

ENTERPRISING EXHIBITIONS

8th Main, 9th Cross, Shivanagar, Rajajinagar, BANGALORE - 560 010. Phone : 080-3357758 / 6783464,
Fax : 080-3324338 / 3343676 Email : foodexpo2001@yahoo.com / cpfbang @ bgl.vsnl.net.in

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Business & Industrial Trade Fairs Ltd., Unit 1223, 12/F, HITEC, 1 Trademart Drive, Kowloon Bay, Hong Kong. Tel: 852-2865-2633, Fax: 852-2866-1770, 2866-2076, Email: enquiry@bitf.com.hk

ASIA BREW & BEVERAGE 2001
Venue: Verona, Italy
Date: 20-22 June, 2001

Asia Brew and Beverage 2001 is organised by Business and Industries Trade Fair Ltd. one of Asia's largest exhibition organisers. The exhibition is a high level meeting platform for regional producers, traders and importers. More than 10,000 buyers are expected to visit the fair.

Exhibition Profile: Products on display cover bar and pub facilities; catering and dispensing equipment; beer, wines and beverages; as well as beer and beverage machinery and installations, operating equipment, measurement and control technology, energy management, disinfection, labelling and packaging systems, raw materials and additives.

For more details contact:

Business & Industrial Trade Fairs Ltd., Unit 1223, 12/F, HITEC, 1, Trademart Drive, Kowloon Bay, Hong Kong. Tel: 852-2865 2633, Fax: 852 2866 1770, 2866 2076. Email: brew@bift.com.hk.

2001 TEA & COFFEE WORLD CUP
Venue: Amsterdam, The Netherlands
Date: 26-28 June, 2001

Organised by Lockwood Publications and sponsored by Tea & Coffee Trade Journal and Tea & Coffee Asia, the 2001 Tea & Coffee World Cup is the only exhibition/symposium in Europe that offers one-stop shopping for everything relating to coffee and tea.

A global trade show for coffee and tea products, equipments and services, an innovative forum presenting the most up to date information relating to tea & coffee. 2001 Tea & Coffee World Cup will have over 250 exhibitors from across the world. About 4,500 buyers are expected at the show.

For more details contact:

Show Manager, Frank Schuetze. Tel: (49) (30) 645-7212, Fax: (49) (30) 640-9135, Email: fbsch@t-online.de

MACFRUT 2001
Venue: Cesena, Italy
Date: 03-06 May, 2001

Macfrut 2001 is the 18th International Exhibition for Equipment, Technology & Services for the Production, Processing and Marketing and Transport for Fruits & Vegetable.

The Italian Trade Commission in Mumbai is a Government agency which provides information and assistance to Italian and Indian firms interested in bilateral trade. They organize seminars, workshops, delegation to trade fairs, one-to-one business meets, factory visits and other promotional events.

Alongwith the organiser of "MACFRUT2001", they are currently promoting a semi-sponsored delegation of Indian businessmen interested to visit this exhibition to be held from 03 to 06 May, 2001, in Casena, Italy. This trade show will host over 700 carefully selected, Italian & international companies, to present latest innovation in the sectors of plants & systems, technology & services for the production, storing, commercialization and trans-

port of fruits and vegetables.

All the participants of the delegation will be offered:

- > Air travel at discounted rates
- > Free hotel accommodation for 4 nights in a 4 star hotel
- > Free airport hotel/airport group transfers
- > Free transfer from hotel to the fair grounds and back to the hotel
- > Complimentary entry tickets and assistance to the delegation during the fair
- > Complimentary lunch
- > Assistance for acquiring visa

The trade mission will be accompanied by senior trade analyst — Mr. Trevor D'Lima, specialized in the sector who will be in position to provide assistance in arranging meetings, etc. The package tour is being organized by a local travel agency.

For more details contact:

Italian Trade Commission, 115 Maker Chamber VI, 11th Flr, Nariman Point, Mumbai 400 021. Tel: 022-282 1125/1214/ 2815654/ 5655, Fax:022 282 1085, Website: www.macfrut.com Email: icemb@vsnl.com

EXPO-PACK MEXICO
Venue: Expo SantaFe, Mexico
Date: 26-29 June, 2001

Pack Expo Mexico a show held once in two years promises to be the largest packaging show. It is sponsored and organised by the Packaging Machinery Manufacturers Institute (PMMI) a trade association, whose members manufacture packaging and packaging related machinery. About 1500 exhibitors and about 20,000 visitors are expected at the fair.

Exhibition Profile: Packaging Machinery and Equipment • Food processing Machinery • Equipment • Raw Packaging Material • Services

For more details contact:

Packaging Machinery Manufacturers Institute, 4350, North Fair Fax, Drive, Suite 600, Airlington, Virginia 22203 USA. Tel: 703 243 8555, Fax: 703 243 8556, Email: pmmi@pmmi.org

AGRI INTEX 2001
Venue: Coimbatore, Tamil Nadu
Date: 1-5 August, 2001

Organised by Tamil Nadu Agricul-

tural University in collaboration with Coimbatore District Small Industries Association (CODISSIA) the biggest Association of its kind in the country enjoying support of over 4000 industries international agricultural exhibition. Agri Intex 2001 aims to highlight development, growth and opportunities in modern agriculture and all the related activities of rural, national and global nature.

AGRI INTEX 2001 will be the meeting point for the lead players in their respective fields to launch and market their products, technologies, expertise and services through interaction with large variety of domestic and international participants and visitors.

Coimbatore finds a prominent place in the Industrial & agricultural, progressive engineering, modern textiles, professional education & research institutions.

For more details contact:

Agri Intex 2001, CODISSIA TRADE FAIR COMPLEX G.V. Fair Grounds, Avinashi Road, Coimbatore 641014. Tel: 91-422-593505, 593507, Fax: 91-422-593506 Email: cointec@vsnl.com

SIAL asia

news

**The International Food, Beverage,
Wine & Spirits Exhibition for Asia**

5 – 8 June 2001
Halls 3 & 4, Singapore Expo

The Organisers:

**SIAL
asia**

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Pico Creative Centre
Singapore 339411
Tel: (65) 392 9269
Fax: (65) 392 9260
Email: afifah82@pacific.net.sg



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France
Tel: (33-1) 4968 5605
Fax: (33-1) 4968 5632
Email: lolarte@sial.fr

SIAL ASIA Tackles Today's Crucial Food Issues Head-on

Come 5 June, an international quorum of food professionals will gather at SIAL ASIA to address crucial issues facing the food industry today, such as the most recent food scares.

Two seminars with an impressive line-up of leading industry representatives have been specially organised to address different aspects of food safety, a topic very much on everyone's mind lately.

The exhibition, so far, has attracted the participation of both international food producers as well as distinctive suppliers with their own unique brands, and includes confirmed country pavilions: Australia, China, Egypt, France, Hong Kong, Italy, Netherlands, Pakistan, Singapore, Spain & the USA. These individual companies and country groups from more than 33 countries worldwide, will be introducing many more new and interesting products, for the food & beverage industry.

SIAL ASIA 2001 presents a great opportunity for anyone involved in the food process, whether in production, distribution, retail or catering, to keep abreast of current issues affecting the food industry today.

2000 was a very exciting year for the SIAL family of shows. Surpassing all previous records, the 5231 exhibitors from 94 countries and 132,813 visitors from 185 countries who gathered for the five-day mega event helped SIAL retain its position as the leading global trade meeting place for the food industries. The April launch of SIAL CHINA saw such great success that we have decided to hold this biennial show annually.

We are therefore very optimistic for 2001, officially the first year of the new millenium. March saw the launch of SIAL in Montreal, Canada, with 684 exhibitors from 48 countries and more than 13,500 trade visitors. SIAL CHINA takes place in Beijing this April. And June will greet the return of SIAL ASIA.

In spite of being launched right in the middle of the Asian financial crisis back in 1999, SIAL ASIA made an impact. The show clearly established itself as a quality event for the food trade, winning the coveted "Approved International Fair" status given by the Singapore Trade Development Board. Usually accorded to events with a track record, we are especially encouraged by this official support. We are determined to continue to exercise the same level of professionalism and expertise that is so unique to SIAL brand of shows.



SIAL ASIA 2001 looks promising. The exhibition proper is achieving full capacity, with several country groups signed up. Many companies are returning for this second edition and there are many more new exhibitors. We are also excited by the line-up of activities organised specially for this exhibition. (Details are enclosed within.)

5 – 8 June 2001 at the Singapore Expo - These are the dates to note in your calendar.

I look forward to welcoming you to SIAL ASIA 2001 this June.

Gilles Vaucelle
Gilles Vaucelle
Member of the SIAL Board of Directors
Chief Executive Officer, Expositum Far East

Two-part seminar
series focuses on
Food Safety
see next page for details



HALAL seminar "Halal – The New Economic Miracle"

Jointly organised by SIAL ASIA & Ilham Daya Sdn Bhd, the two half-day seminar tackles the safety issue by introducing halal as a complete system relevant for global application. Seminar topics will look at the concept and appreciation of Halal, and the recognition of it as a global standard, going beyond race, creed or religious beliefs.

Programme

Wednesday 6 June 2001 (2.00 pm – 5.00 pm)

Halaalan Thoyyiba - The View from a Non-Muslim
by Dr. Alan Smyth

Halaalan Thoyyiba Global Standard^{CM} – The New Halal Standard
by Mohamad Nordin Abdul Karim, Ilham Daya Sdn Bhd

Thursday 7 June 2001 (9.00 am – 12.00 pm)

The Integration of Halal Requirements into Food Safety Certification
by Mr. John M Baker, SGS

HT Global StandardTM: The Economic Miracle
by Dr Fathil bin Mohamed, Ilham Daya Sdn Bhd

Cost: S\$120.00 *

* Fee is inclusive of 3% GST and covers administration costs, seminar materials and coffee breaks.

FOOD SAFETY seminar Wednesday 6 June 2001 (9.00am)

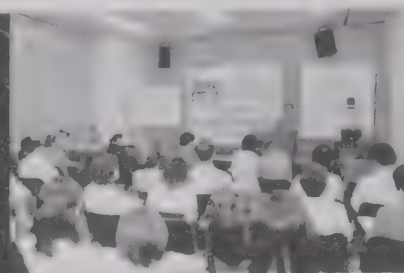
BSE or "mad cow disease" and more recently, the foot and mouth disease outbreak are making the headlines. These food scares have brought the issue of food safety to the forefront. Consumers are demanding assurances and guarantees for safer food which food producers and suppliers have the obligations to meet.

The seminar will be drawing on an international line-up of food safety experts to provide some answers. Topics include an overview of food safety awareness in the Asia-Pacific as well as global initiatives now being instituted in Europe, with a special case study on Australia & New Zealand.

Cost: S\$90.00 *

* Fee is inclusive of 3% GST and covers administration costs, seminar materials and coffee break.

bonus
for seminar participants
FREE ENTRY
to the exhibition.
To pre-register, please
complete the
pre-registration form.



seminar REQUEST FORM

Please send me more information on:

- ☐ The Halal Seminar
☐ Food Safety Seminar
☐ both the Halal & Food Safety seminars

(Please complete in block letters.)

Please fax to: (65) 392 9260 or

mail to: SIAL ASIA PTE LTD, 20 Kallang Avenue,
2nd Floor, Pico Creative Centre, Singapore 339411.

Name:

Surname/Family name

First name

Job Title:

Company:

Address:

City:

Postal code:

Country:

Tel:

Fax:

Email:

For more information & pre-registration, please contact:

Orient Explorer(S) Pte Ltd

141 Middle Road, #03-02C

GSM Building

Singapore 188976

Tel: (65) 339 8687 Fax: (65) 339 9536

Email: orientexplorer@pacific.net.sg

Contact: Ms Irena ONG/ Ms LIM Chee Yi

HEALTH TREND *showcase*

Due to the success and interest generated at SIAL ASIA 99, the Health Trend Showcase this year has been greatly expanded, to create even greater awareness of healthier food choices and thus healthier living. The exhibits will be displayed under four separate categories: nutrient (modified/nutrient enhanced products), functional foods, natural/organic foods and others (specialty and dietetic products). Selection of products will be based on nutrition/health value, taste, credibility of research documentation or proof of approval from relevant authorities and information package of clarity, creativity and presentation.

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in the global marketplace.



Confirmed & Announced Exhibitors as at 13 March 2001

Acetifico Acetum, Italy, grocery - olive oil. ADAR Trading L.L.C., UAE, grocery - dried fruits. Adin, Israel, grocery. Agritalia, Italy, grocery - preserved. Agromiser, Egypt, grocery - dried fruits. Al Madinah Dates Co., Saudi Arabia, grocery - dried fruits. Albani Breweries, Denmark, beverages - beer. Alkaramah Dough Production Factory, Saudi Arabia, bakery - frozen foods. Aloe Jaumave, Mexico, grocery - ingredients. Antico Pastificio Morelli, Italy, grocery. Asia & Middle East Food Trade, Germany, publication. Asia Pacific Food Industry, Singapore, publication. Asian Hotel & Catering Times, Hong Kong, publication. Australian Prestige Wines, Australia, wines. Azaiez Abdelattif, Tunisia, grocery - olive oil. BADR Day Co., Iran, grocery - dried fruits. Bakkerij Van Diermen, Netherlands, frozen bakery products. Bantry Bay Seafoods, Ireland, seafood. Barnier Production, France, grocery - olives. Basso Fedele, Italy, grocery. Bestfood Company, UAE, grocery. Beverage Food World + Export Gazette, India, publication. BOH Plantations Sdn Bhd, Malaysia, tea pavilion. Boizet, France, meat & seafood - cured. Bornholms, Denmark, seafood. Boyer, France, fresh products - fruits. Bumble Bee Seafood, USA, seafood. Caves de Fronton, France, wines. CCI Sevilla, Spain, Spanish Regional Pavilion. Centro Estero Alpi del Mare, Italy, wines. Cerebos (Australia) Ltd, Australia, grocery. Charbonneaux - Bravant, France, grocery. Charles de Cazanove, France, wines. Château Roubine, France, wines. Chinatown Food Corp. Pte Ltd, Singapore, grocery. Chop Hup Chong, Singapore. Coco Winds Holdings, China, non-alcoholic beverages. COFACE, France, French insurances. Comité de Promotion des Promotion des Provence Alpes Côte d'Azur, France, French region promotion. Corex, Italy, grocery - preserved. Cuild'Or BV, Netherlands, frozen bakery products. Dahlgren, USA, sunflowers. East West Development, USA, services. Egyptian Exporters Association Expolink, Egypt, Egyptian Pavilion Organiser. Egyptian Marketing Centre SRL, Egypt, confectionery - biscuits & pastry. El Rashidi El Mizan, Egypt, grocery - bakery products. ENZA Foods New Zealand, New Zealand, beverage. ESSEC MBA, France, MBA agri-food program. Euromonitor International (Asia) Pte Ltd, Singapore, market research. Ferrigno, France, grocery - ready to eat meals. Française de Gastronomie, France, grocery - ready to eat meals. G. Costa, Thailand - U.K, grocery. Gan Teck Kar Investments, USA, services. Genesis Arts Pte Ltd, Singapore, roast nuts. Goodwill Food Marketing Sdn Bhd, Malaysia, grocery - ingredients. Great Pac Sdn Bhd, Malaysia, grocery - confectionery. Groupe Jeanjean, France, wines. Groupe Lea Vital, France, grocery - ingredients. Gruppo Italiano Coffe, Italy, grocery - coffee. GTNR Export, Italy, alcoholic beverages. Hiestand (Asia Pacific) Pte Ltd, Singapore, grocery - confectionery. Homart Pty Ltd, Australia. Honey Well, Egypt, grocery - confectionery. Hong Kong Trade Development Board, Singapore, Hong Kong Pavilion. Hospitality Asia/ Beverage World Asia, Malaysia, publication. Hotel Asia Pacific, China, publication. Hume Riverina Business Connect Inc., Australia, grocery. ICE, Italy, Italian Pavilion Organiser. IMEX Management, USA, USA Pavilion Organiser. Imperial Products, Portugal, grocery - confectionery. Imperial Tea Exports, Sri Lanka, tea pavilion. Insa Corporation, Indonesia. Island Oasis, USA. Kaha, Egypt, fresh products - frozen juices. Korea Ginseng Manufacturer, Korea, health food. Kwik Enterprises, USA, vitamins & food supplements. Le Caselle, Italy, grocery - bakery products. Les caves de Landiras - Louis Eschenauer, France, wines. Les Grands Chais de France, France, French Pavilion. Link Snacks, USA, confectionery - biscuits. Lockwood Publications Inc., USA, publishing. Lothar Friedrich, Austria, wine. Manna Duniaboga PT, Indonesia, grocery. Medan Pulangan Sdn Bhd, Malaysia, grocery. Middle East Products Export, Iran, grocery - dried fruits. Mina For Oil, Egypt, grocery - olive oil. Misr Café, Egypt, grocery - coffee. Miss Meringue, USA, confectionery. Mokate, Poland, grocery - coffee. Mutual Benefits Int'l Food Group Co Ltd, China, grocery. Naspac Marketing, Singapore, Singapore Pavilion. National Flour Mills, UAE, grocery. National Food, Egypt, grocery - juices. Natural Way Co Ltd, Japan, grocery - children food. Nebraska Dep of Agriculture, USA, services. Netherlands Pavilion, Netherlands, pavilion. Nivaa, Netherlands, fresh vegetables. Nutrition International, Singapore, beverage - health drinks. Oranfrizer, Italy, fresh products - beverages. Orellana Intertrade, Mexico, grocery - beverages. Orient Foods Pte Ltd, Singapore, grocery - sauces. Owl International, Singapore, beverage - coffee. P.T Prima Sejahtera, Indonesia, beverage - health drinks. Panola Pepper, USA, grocery - hot sauces, peppers, olives. Peerless Foods, Australia. Perdue, USA. Peter Knipp Holdings Pte Ltd, Singapore, publication. Prima Food Pte Ltd, Singapore, grocery. Pure Herbal Remedies Pte Ltd, Singapore, health food. Quinson, France, wines. Remy Pannier, France, alcoholic beverages. Rikevita (Singapore) Pte Ltd, Singapore, grocery - ingredients. Salem Baking, USA, grocery - cheese straws, cookies. Sanitarium Health Food Company, Australia. SB&B Foods, USA, soybeans. Seara Food Asia, Singapore, meat & seafood. SEFIAA Vitrac, Egypt, grocery - juices - honey. SFAX Huile, Tunisia, grocery - olive oil. Shandong Foreign Trade Yongfeng Co. Ltd, China, fresh fruit & vegetables, dried fruit. Sime Darby Edible Products Ltd, Singapore, oil. Singapore Trade Development Board, Singapore, trade board. Sin Hwa Dee Foodstuff Industry Pte Ltd, Singapore. Société Vins et Cremants d'Alsace, France, French Pavilion organiser. Sopexa, France, French Pavilion Organiser. Sopexa Singapour, France. Singapore Office of Sopexa. South African Raisins, South Africa, fresh products - fruits. Southend International, USA. Speciality goods (NZ) Ltd, New Zealand, fresh food - frozen food. Spice Land, Egypt, grocery - spices. Status Point, Malaysia, grocery. Suprex, France, alcoholic beverages. Sweet SpA, Italy, confectionery - biscuits, pastry. Syarrum Ostriches, Singapore, infusion. The 1872 Clipper Tea, Singapore, infusion. The Appointment Group, Australia, juices. Teo Lian Yew Enterprises, Singapore, infusion. The 1872 Clipper Tea, Singapore, infusion. The Appointment Group, Australia, Australia Pavilion. Tristar, Netherlands, grocery - health - dairy products. US MEAT Export Federation, USA, meat. USAPEEC, USA, poultry. Utoc Enterprises, Singapore. Valin, Italy, grocery. Victa, France, meat & seafood. Vieira de Castro, Portugal, grocery - baked products. Volaven, France, meat & seafood. Wanin Industries, Singapore, mineral water. Wine & Dine, Singapore, publication.

Other SIAL events not to be missed:

SIAL CHINA	10 – 13 April 2001, Shanghai, China
SIAL MERCOSUR	21 – 24 August 2001, Buenos Aires, Argentina
SIAL PARIS	20 – 24 October 2002, Paris, France

PRE-REGISTRATION FORM

For trade visitors only

First Name: _____

Family Name: _____

Job Title/Position: _____

Company: _____

Address: _____

City: _____ Postal Code: _____

Country: _____

Tel: _____ Fax: _____
(include country and area codes) (include country and area codes)

Email: _____

Pre-register immediately and save S\$65.00

If you are qualified trade visitor, complete and fax this form to (65) 392 9260 or mail this form to reach us by 12 May '01 (for foreign visitors only), 19 May '01 (for Singapore visitors only), to receive in advance your complimentary visitor badge to gain free admission to SIAL ASIA 2001 for all four days. You may also pre-register at our website: <http://www.sialasia.com>.

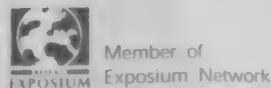
After the deadlines, visitors without a pre-registration form or badge will be charged an admission fee of S\$40.00 for a one-day pass or S\$65.00 for a 4-day pass.

Admission Requirements:

The exhibition is open to trade and business visitors only. The general public and minors under age 16 will not be allowed entry. Visitors must be in proper business attire. Those inappropriately dressed will be refused entry. Admission is free for badge holders and pre-registered visitors. (In order to enjoy free entry into the exhibition, please return this form before the specified deadline. You may also register through our website at <http://www.sialasia.com>).

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Your Position (tick one only):

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- ☐ A3 Purchasing Manager/Purchasing/Buyer
- ☐ A4 Import Manager/Import
- ☐ A5 Sales & Marketing Manager/Sales & Marketing
- ☐ A6 Export Manager/Export
- ☐ A7 Chef
- ☐ A8 Food & Beverage Manager/Food & Beverage
- ☐ A9 Technical Manager/Technical
- ☐ A10 Research & Development
- ☐ A11 Communications & Public Relations
- ☐ A12 Journalist/Writer
- ☐ A13 Others (please specify): _____

Your Company's Business Activity (tick one only):

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- ☐ B3 Fast Food Chain/Outlet
- ☐ B4 Trade/Wholesale/Import
- ☐ B5 Retail
- ☐ B6 Distributor/Agent/Representative
- ☐ B7 Purchasing Office
- ☐ B8 Institutional Catering
- ☐ B9 Independent Commercial Catering
- ☐ B10 Export
- ☐ B11 Manufacturing
- ☐ B12 Trade Association
- ☐ B13 Consultancy/Services
- ☐ B14 Academic
- ☐ B15 Others (please specify): _____

Product Sector of Your Interest:

- ☐ C1 Alcoholic Beverages
- ☐ C2 Children's Food & Health Food
- ☐ C3 Confectionery, Biscuits & Pastry
- ☐ C4 Convenience Food
- ☐ C5 Cured Meats
- ☐ C6 Dairy Products, Eggs
- ☐ C7 Delicatessen Products
- ☐ C8 Food Ingredients
- ☐ C9 Fresh & Semi-Preserved Fish, Molluscs & Shellfish
- ☐ C10 Fresh Fruit & Vegetables, Dried Fruit
- ☐ C11 Fresh Meat & Offal
- ☐ C12 Fresh Poultry & Game
- ☐ C13 Frozen Food
- ☐ C14 Grocery Products (including Pulses & Pasta)
- ☐ C15 Halal Food
- ☐ C16 Horticulture
- ☐ C17 Non-Alcoholic Beverages
- ☐ C18 Organic Products
- ☐ C19 Pet Food
- ☐ C20 Private Labels
- ☐ C21 Products for the Catering Sector
- ☐ C22 Professional Services & Federations
- ☐ C23 Tinned Products & Other Preserved Products

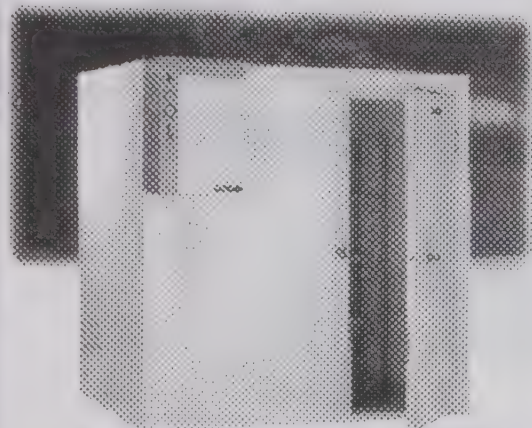
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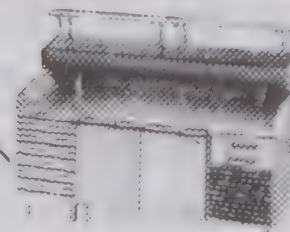
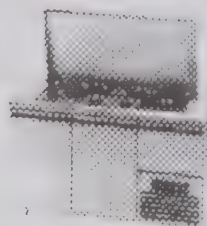
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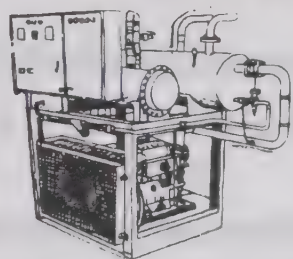
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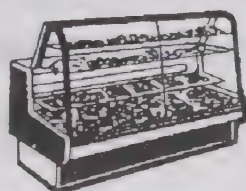


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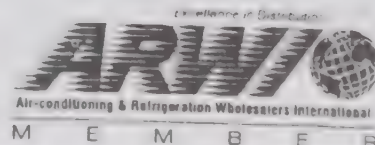
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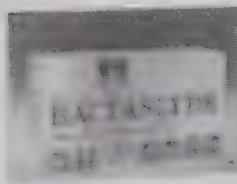
Raha



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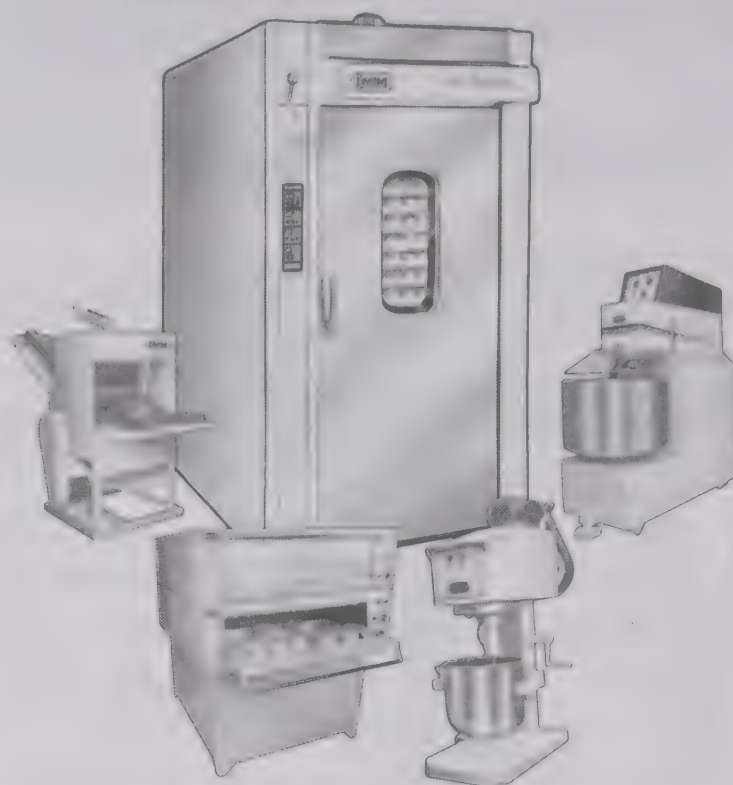
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PRODUCT REVIEWS

TURNKEY MINERAL WATER PROJECT/WATER TREATMENT

Aguapuro Equipments offer turnkey mineral water projects and water treatment projects ranging from Dosing Equipment, Multimedia Sand/Carbon Filters, Softeners, Demineralisation Systems, Reverse Osmosis Systems (UF/NANO), Micron Filters/UV, Sterilizer systems, Ozonators. They also provide spares and services for any make of water treatment plants.

Special features of these are • compact skid mounted systems • specially designed for individual application • Economical and fast delivery. The company also provides turnkey projects for manufacturing mineral/pure water.

For further details, contact:

Aguapuro Equipments
2/22, Panwala Bldg.
Dr. S.S. Rao Road
Lalbaug, Mumbai 400012
Tel: 4101432, 4155576
Fax: 4155576
Email: aguapuro@vsnl.com

COLD ROOMS



Geerlofs Refrigeration from Netherland are specialists in setting up precold and cold stores, freezer stores, blast freezer &

Tel: (O) 44-489 9340/41
Fax: (O) 44-489 9343
Email: geerlofs@vsnl.com

I.Q.F. for storage of fruit, vegetables and agricultural products. They are useful in Horticulture * Floriculture * Tissue Culture, Agricultural products * Seeds, Spices & Herbal Products * Food & Dairy Products, Meat, Fish * Poultry * Warehouses * Cargo Complexes Supermarket outlets.

For further details, contact:

Geerlofs Cooling India Pvt. Ltd.
(Old No.43) New No. 69
Fourth Avenue
Ashok Nagar
Chennai 600 083

COLT SERIES COMPRESSORS

"Colt" series compressors manufactured by Super Refrigeration (India) Pvt. Ltd. are most suitable for industrial refrigeration and low temperature applications such as in cold storage, ice plants, fisheries plants, ice cream plants, dairy plants, chemical plants, pharmaceutical plants and air condition plants, "Colt" range of open type compressors are available in single as well as in double stage versions with use on ammonia (NH₃), R-12 and R-22 refrigerant etc. They are well-designed and robust machines capable of running continuously, for prolonged period with minimum attention. These compressors, by virtue of their high speed and multiplicity of cylinder are exceptionally compact and economical of space. They are also designed to accommodate varying refrigeration demands with maximum economy in power and are well suited to automatic installations.

For more details, contact:

Super Refrigeration (India) Pvt. Ltd.
408, Vikram Tower
16 Rajendra Place
New Delhi 110 008
Tel: 011-5825774 • Telefax: 011-5825775
Email: superrefrigeration@mantramail.com
Website: www.superrefrigeration.com

AIR CURTAINS

Russell Air-Curtains marketed by Donromos Pvt. Ltd., create an uniform formidable barrier of air stream at an opening against heat, dust, smoke, odour and insects, without hindering the movement of people and merchandise in and out of the area.

Manufactured by maintaining strict quality control right from procurement of raw materials to the final assembly line, the product undergoes mandatory rigid tests before it leaves factory premises. The radial flow configuration attained with specially designed body and impellers along with

power efficient motors ensures air displacement at minimum noise levels. Its aesthetic elegance and sleekness matches all interiors and is available in Horizontal, Vertical and Portable models in powder coated and stainless steel bodies for commercial and industrial places.

For further details, contact:

Donromos Pvt. Ltd
Russell House, 74, 2nd Hasnabad Lane,
Opp. Willingdon Gym.,
Santacruz (W)
Mumbai 400 054
Tel: 605 5028/6497615
Fax: 605 5027
Email: russell@bom5.vsnl.net.in

REFRIGERATION

Refrigeration plays a major role in the processing of foods and beverages. It is widely used in the manufacturing process for product cooling, freezing and also for preservation of products. Refrigeration is a part of 'utilities' reputed for the manufacturing processes York Refrigeration offers advanced solutions for all kinds of refrigeration problem. They manufacture a vast range of refrigeration products like * Piston/Screw Compressors * Tube/Flake ice machines * Package Chillers * Contact plate freezers *

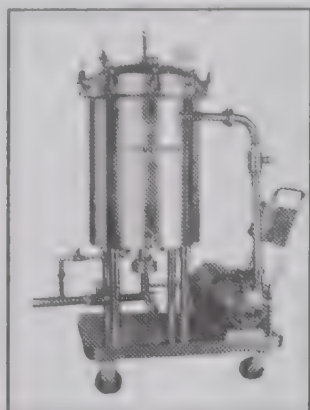
Evaporative Condensers * Air coolers. The company has a ready stock of original spare parts. These products are used in various industries like Beverages, Breweries, Dairy Industry, Seafood Industry, Fruits/Vegetables Storage, Meat and Poultry Processing.

For more details, contact:

York Refrigeration India Ltd.
'Kamadhenu', Senapati Bapat Road
Pune 411 016
Tel: 020-5653864/65/73
Fax: 020-5653874
Email: york@yorkrefindia.com

FILTER PRESS

Kothari Pharma, a Mumbai-based company, offers a unique Sparkler Type Horizontal Filter Press, which enables overcome all filtration problems in pharmaceuticals, chemicals, distilleries, beverages, oil, ink and other such industries. The Filter Press has a sturdy body made out of high quality SS 304/316/316L metal, and comes with a mirror-polished finish.



**Filter Press
standard model
with back wash**

Kothari Pharma offers various models of the Filter Press depending on output and quality of liquids. The standard models available are in the range of 8", 14", 18", 24" and 33". The filtration capacity ranges from 600 l/hr to 30,000 l/hr and the cake holding capacity from 2.2 ltrs to 230 litres. The flow rate and pump selection depends on the viscosity of the liquids.

The heart of the Filter Press is a filter cartridge assembly having SS filter plates, support screen, interlocking cup and pressure tank. Fitted with an ISI certified motor covered by SS sheet, the Filter Press is mounted on moveable SS trolley fitted with fibre castor wheels for easy movement. After filtration, the Filter Press facilitates easy removal of the cake (left-over solid matter) formed between the plates. Other salient features of the equipment includes a sample collecting device and a facility for filtering out hold up of the liquid. The convenient modular design of the filter press ensures easy operation and maintenance-free function.

Kothari Pharma, which has established a reputation in the production of a wide range of filtration equipment for the pharmaceutical and chemical industries, also offers special facility for trial on the Horizontal Filter Press.

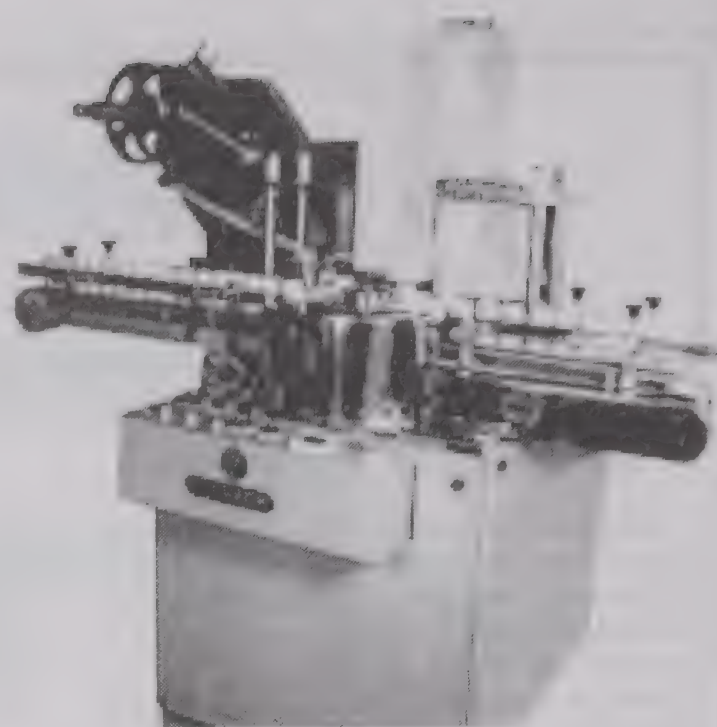
For further information, contact:

Kothari Pharma
C/11, M.K. Bros Indl. Estate
Jarimari
Andheri-Kurla Road
Andheri (E)
Mumbai - 400072
Tel: 8510837, 8512794, 8592888
Fax: 8513584

FOIL SEALING MACHINE

This sealing machine from Jet Pack machines can be used for sealing the neck of PET/HDPE containers. The purpose for sealing is to prevent the product inside the container from pilferage or losing aroma, characteristics etc. The machine accommodates different type of foils like Aluminium Poly/Paper Poly/Lacquer Coated Paper etc. The machine can give speeds of upto 70 seals per min. depending on the size of the container and the weight. This machine finds application in Masala(chilli powder, hing, readymade masala etc), Glucose Powder flow wrap or any other hygroscopic powders, Pharmaceutical powders, Adhesives etc. The machine can be connected to filling as well as capping machine.

Other machines manufactured by Jet Pack are: Semi Automatic and Automatic (Single and Twin Head) Powder Filling Machine, Semi Automatic and Automatic (Single and Twin Head) Cream/Paste filling Machine, Automatic Capping and Cap Pressing Machine, Automatic Flow Wrapping Machine, Automatic Bottom Coding Machine, Automatic Composite Can Filling/



Sealing machine and Special Purpose Machine.

For further information, contact:

Jet Pack Machines
C-18, Nand Jyot Indl. Est.,
Safed Pool, Andheri Kurla Road,
Saki Naka, Mumbai 400 072.
Tel: 91-22-8516489/8515561
Fax: 91-22-8516489
Email: jetpack@vsnl.com

REVERSE OSMOSIS SYSTEMS

Komal Drinking Water Systems offer leading edge Reverse Osmosis technology and performance within a compact, economical unit. Komal's three stage process utilizes a reverse osmosis membrane and pre-and-post filters Komal combines the resources of the two leaders in high purity water: Osmonic Inc. USA the world leader in Membrane Technology and Komal Industries, pioneer in Water Treatment Plants in India.

Komal manufactures off-the-shelf Reverse Osmosis System both for industry and to produce high purity drinking water for domestic purpose. R.O. System provides the ultimate in pure water requirement for drinking water and reduces the salts and eliminates organic, bacteria, virus and pyrogen. R.O. System can effectively be employed for reducing salt content of highly saline brackish water into drinking water. Plants are preassembled and are ready to connect.

Standard sizes are available from 30 lts./hr. to 1000 lts./hr to produce excellent quality of drinking water. Trouble free, quiet operation and easy maintenance makes Komal R.O. System a first choice. Other advantages include: * Preassembled at factory ready to operate * Minimal, if any, pre-treatment required * Wide range of membranes available for different applications like ultra pure water production for electronic industry and laboratory * For purified water, free from bacteria, pyrogen * For Pharma and Unit for concentration and recovery of valuable material.

For further details, contact:

Komal Industries
108 Creative Ind. Centre
12 N.M. Joshi Marg
Lower Parel
Mumbai- 400011
Tel: 3091090, 3091174
Fax: 022-3062711
Email: kcc@giabmol.vsnl.net.in

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Delair (India) Pvt. Ltd., an ISO 9001 company supply world class quality compressed Air Dryers to suit your requirements. Delair™ Refrigeration Dryers which are 60% more energy efficient are fully automatic, having small foot print and a choice of air or water cooling.

Also available are Adsorption Type Heatless Dryers.

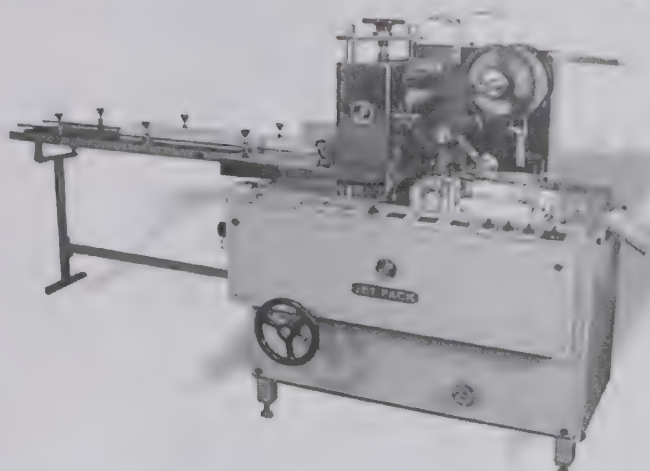
For more details, contact:

Delair (India) Pvt. Ltd.
Delhi
Tel: 3912800
Fax: 011-3915127
Email: delair@pahwa.com
Website: www.delairindia.com

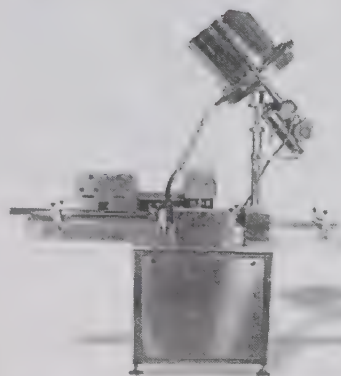


JET PACK

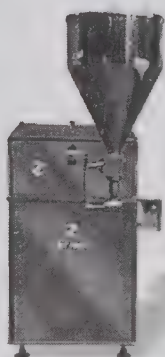
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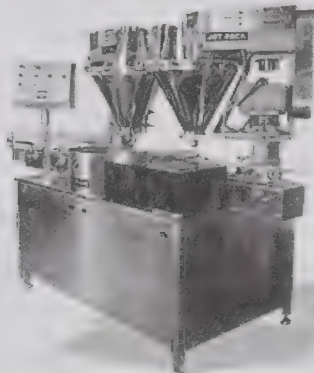
Cap Pressing Machine



Cream Paste Filling Machine



Semi Automatic & Automatic Powder, Spices & Masala Filling



Other Ranges of Machines from JET PACK

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- Automatic Coding Machine
- Insert Pressing and Sealing Machine

For Details Contact JET PACK MACHINES

C-18, Nandiyot Indl Estate, Safed Pool, Kurla-Andheri Rd,
Sakinaka, Mumbai - 400 072. Tel: 851 6489 / 851 5561 / 856 0800
Fax: 851 6489 Email: jetpack@vsnl.com

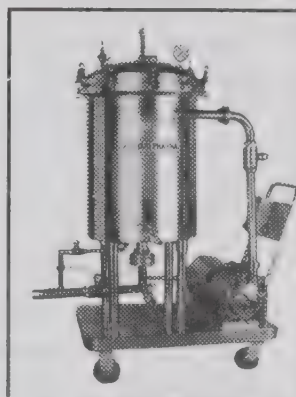
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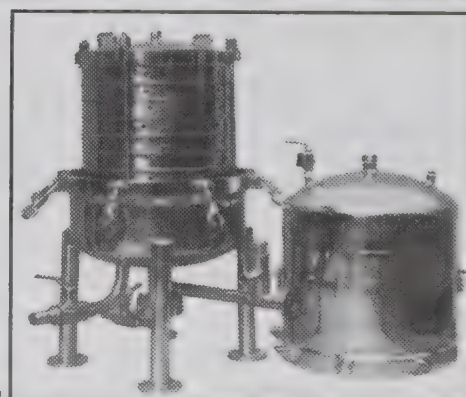
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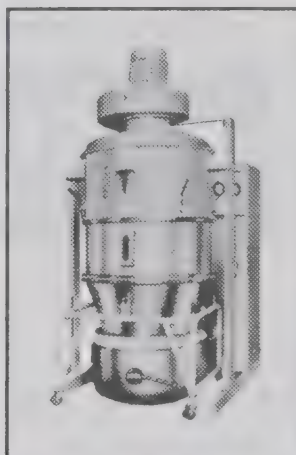
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V.L. Rd., Kandivali (West), Mumbai - 400 067.
Tel. Nos: (022) 8020141 / 8061337
Fax No: (022) 8061337
Email: jaychem@bom3.vsnl.net.in



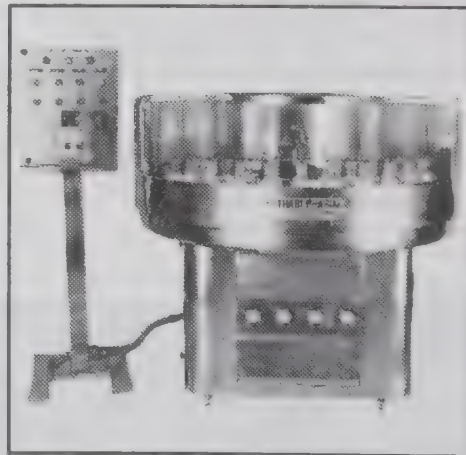
Filter Press
standard model
with back wash



Filter Press
Zero hold up (Reverse flow)
with back wash



Fluid Bed Dryer



Rotary Bottle
Washing M/c.

kothari pharma

MFGS. OF MACHINERIES & EQUIPMENTS FOR PHARMACEUTICALS & CHEMICAL APPLICATIONS

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ANDHERI (E), MUMBAI - 72. TEL.: 851 0837/2794/859 2888 FAX: 91-22- 851 3584
E-mail: chandrakant@kotharipharma.com Website: www.kotharipharma.com
Offices: Ahmedabad, Bangalore, Delhi, Hyderabad, Indore, Bangladesh.

WASTE WATER TREATMENT

Aqua Filsep Inc. committed to Water and Waste Water Treatment, have considerable experience in providing to the industry, solutions to water and waste water treatment. Consequently, the company has developed expertise in process equipment, control design, and construction of custom-engineered systems for a wide range of applications, with active support of their associates, Osmonics Corporation, USA and Aquafine Inc., USA.

The various products that **Aqua Filsep** offers are * Water and Waste Water Treatment Plants * Reverse Osmosis Plants, * Demineralisation Plants * Water Softening Plants * Sand Filters and Activated Charcoal Filters * Chemical Dosing Units * Mineral Water Plants * Swimming Pool Water Purification Systems * Waste Water/Effluent Treatment Plants * Clariflocculators, Clarifiers, Aerators. Water and Fuel Treatment Chemicals (For Boiler and Cooling Water Systems):

1. Corrosion Inhibitor 2. Scale Inhibitors 3. Oxygen Scavengers 4. pH Boosters 5. Fuel Additives & Combustion Catalysts.

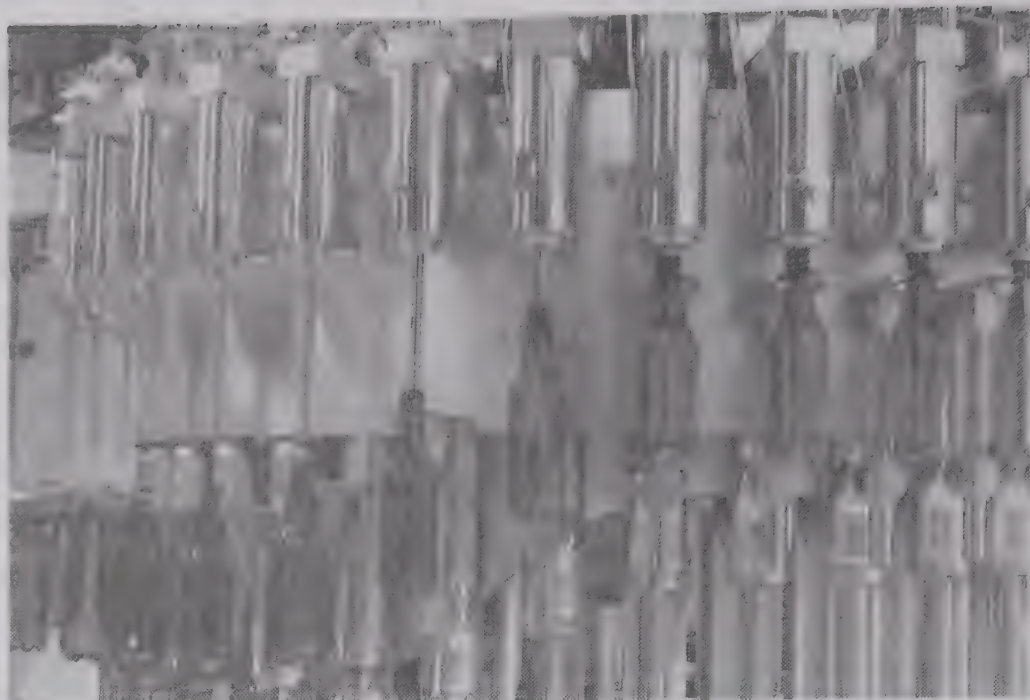
Other Related Products, Spares and Components include: * Membranes, Resins * High Pressure Pumps, Pressure Boosting Systems * Pressure Vessels * Storage tanks for special purpose etc.

The services that the company offers include: After-Sales Services & Annual Service Contract * Modification/Automisation of existing Water & Waste Water systems etc.

For more details, contact:

Aqua Filsep Inc.
7 Retiwala Indl. Estate
H.A. Palav Marg
Byculla (East), Mumbai 400 027
Tel: (O) 3719455
Fax: (R) 4465521
Email: filsep@ad1.vsnl.net.in

PET BOTTLE



The Volumetric VO-DM filler, designed by Krones featuring a ring bowl, has variants able to handle glass or PET bottles, with neck handling or bottle plates as appropriate. It is offered in versions with long-tube or short-tube filling valves, depending on the product involved. For filling PET bottles with beer, the Volumetric VO-DM operates with long-tube filling valves.

All valve functions are electro-pneumatically controlled. The filling valves' working cycles can be individually programmed and controlled, the values set can be stored in memory, and reproduced at will almost instantaneously.

The central computer required for the

are made of V2A (V4A on request), and can be flushed with commercially available cleaning agents. This Volumetric VO-DM is available as a solo filler or in combination with one or more closers, for outputs ranging from 6,000 to 23,000 1-l bottles or 10,000 to 30,000, 500-ml bottles an hour.

For further details, contact:

Krones AG Presseabteilung
Böhmerwaldstraße 5
D-93068 Neutraubling
Germany
Tel: ++49 (0) 9401/70-0
Telefax: ++49 (0) 9401/70-3496
Email: presse@krones.de
Internet: www.krones.de

FOOD PROCESSING MACHINES

Qamar Fabrication Works are specialists in Food Processing machines such as pulpers, pulper-cum-finishers, retorts, pressure vessels, hemispherical dairy equipment, storage tanks, agitators and condensers, kitchen equipment, sterilizers.

The company will design and fabricate

machines to your specifications and requirements.

For your requirements, contact:

Qamar Fabrication
17, Shiv Shakti Industrial Estate
Kurla Andheri Road
Andheri (E), Mumbai 400 059
Tel: 8508871, 859407, Fax: 8329259

SAMS



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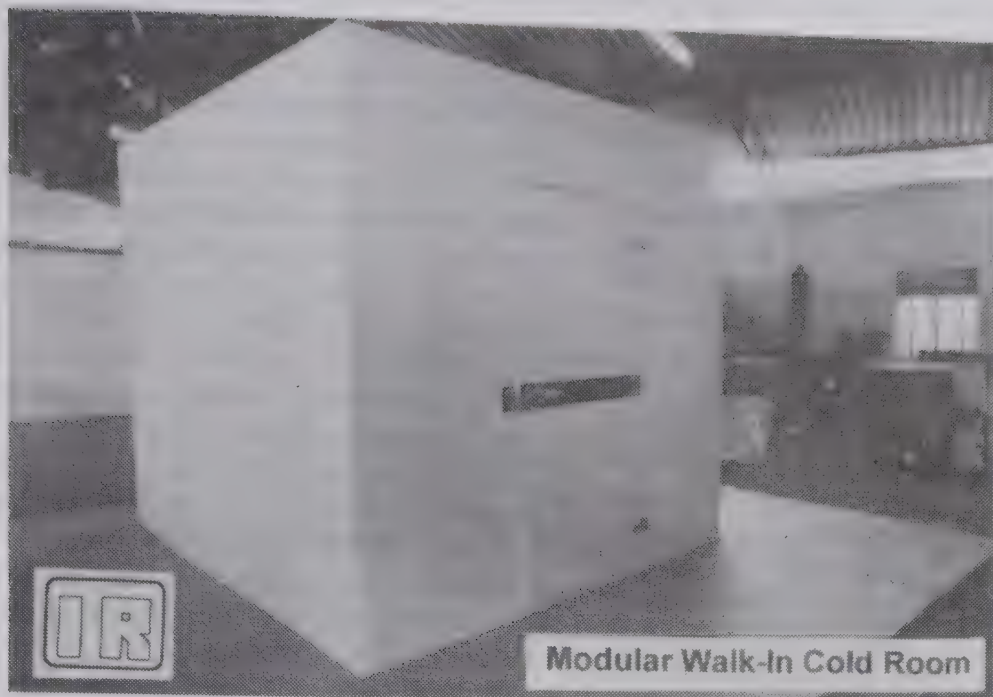
- RED CHILLY SAUCE
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- EGG NOODLES + TASTE MAKER
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FAX: 8367931
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TRADE ENQUIRIES SOLICITED

MODULAR COLD ROOMS



INDUSTRIAL REFRIGERATION PVT. LTD. (IRPL) Offers Cold Stores, Modular Walk-in Cold Rooms, Reach-in-Mini Cold Rooms and Cold Rooms with Display Shelves. These are widely used in Hotels, Hospitals, Industries, Canteen etc.

The Modular panels used for Cold Rooms ranges from 400-600-800-1200mm wide and 40-150 mm thick. The panels

panels and formation of fungi or mould is impossible. The Cold Rooms modular structure is self bearing, it can be disassembled, made bigger or moved to a different location without damaging it in any way. Flooring is of non-slip stainless steel/aluminium suitable for bearing a load upto 2000 Kg/m². Doors can be either hinged type or sliding type. A split or monoblock refrigera-

tion system is incorporated, running on Eco-friendly refrigerants. Thermopane window can be incorporated in the cold room panels which will enable viewing of the products from outside the cold rooms. For critical applications cold rooms, microprocessor controlled temperature and humidity monitoring and data logging system with computer and printer interface can be provided. Besides this IRPL also offer refrigeration equipment to Chemical, Plastics and Pharmaceutical industries.

The Cold Room does not deteriorate with time and does not absorb odours, parasites cannot nest between

consists of two galvanised steel sheets covered with food safe plasticized film. Junction between panels is realized by an eccentric hook system.

IRPL is a part of the 42 year old ALLSTATE Group, involved in Photography, Refrigeration, Transformers and Leisure equipment. Two of our group Companies have agreements with three Fortune 500 Companies viz. Kodak Ltd., UK, Brunswick Corp., USA and Bombardier Corp., Canada.

For further details, contact:

Industrial Refrigeration Pvt. Ltd.

901, Maker Chambers V

Nariman Point

Mumbai 400 021

Tel: 2041183/85/89

Fax: 91-22-2044944

Email: allstate.hathway.com

allstate@123india.com

Website: <http://IMCnet/org/home/inco>

CONVEYOR SYSTEM



Today in business, everyone is looking for saving production time, saving manpower and precious space. Microcraft is engaged in the development of material handling systems which will meet the best need of the customer. Latest development in this field is the inclined Bucket Belt Elevator. Conventional troughed conveyors require low angles of incline to move bulk materials 10° to 18° maximum, depending on the type of material being conveyed Microcraft Inclined Conveyors elevate materials quickly at angles upto 90°, requiring approximately half the space and 1/3 the moving parts of the conventional troughing conveyors, thus less operating maintenance costs. Example: A 45° Microcraft Inclined Conveyor systems requires only 40% of the structure and 30% of the space used with a conventional system. Plus the conveyor belt is non metallic which cuts down regular maintenance

and oiling, giving noiseless operation for years. It is available in PVC or Rubber in food grade material and has a very wide range heat resistance temperature to meet the best needs. The flexible side wall restricts the material from spilling. The entire system can also be made portable to suit different heights at different angles.

They also undertake turnkey projects. The company also manufactures Flat Belt Conveyors, Screw Conveyors, Bucket Elevators, Slat Conveyors, Chain Belt Conveyors, Portables and Stackers.

For further details, contact:

Mr. Michael Moraes (Prop.)

Microcraft Engineering Works

22/23 Paras Industrial Estate

Opp. Bank of Baroda

Navghar, Vasai (E)

Dist. Thane Pin- 401 201

Email: microcraftengg@hotmail.com

BOTTLING LINE SOLUTIONS

A company with over 25 years of experience with design, development, reconditioning, upgrading and refurbishing of Filling Lines with glass, plastic and PET containers, Boncon Engineers Pvt. Ltd. are expert in trouble shooting in all Bottling machines and Liquid Lines such as soft drinks, beer, mineral water, pharma-ceuticals etc. They expertise in lines ranging from 60 bottles per minute to 600 bottles per minute.

Boncon specialises in Gravity Fillers, Pressure Fillers, Conveyors, Case Packers, Uncasers, Bottle washers, Container Rinsers, Unscramblers and allied machinery.

The company offers high quality engineering solutions to machinery and spare indigenisation for either manufacturing unit ventures or end users with effective preventive maintenance plans. Boncon has extensive experience with Indian, Italian, German, English and American machines, both in India and

overseas. The company also offers special purpose customised software for the industry in the area of machinery and facilities maintenance offers.

For further details, contact:

Boncon Engineers Pvt. Ltd.

247, Shiv Shakti Indl. Estate-III

Andheri (E)

Mumbai 400059

Tel: 8501916

Tel/Fax: 850 6381

Email: boncon@bom7.vsnl.net.in

WALK IN COOLERS/FREEZERS



Premier was founded in 1988 concentrating on the Development, Production and Marketing of Industrial / Commercial Refrigeration Systems in India. Today the company is a leading manufacturer of Industrial chilling systems known for setting standards in an otherwise disorganised sector. Premier has three different divisions to take care of customer interests: 1. Industrial Process division 2. Commercial Equipment Division 3. Food Refrigeration Division.



Premier has global out look and keeping



this in vision they have business association with some international companies.

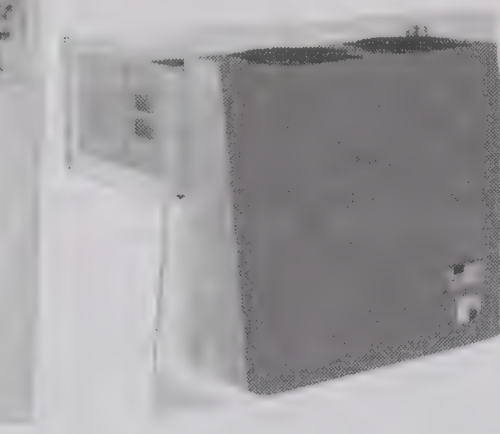
Premier is the authorised distributor for Technoblock Cold Room Units & Cold Room Panels of Refrigeration SPA of Italy in India. Premier Builds and Installs Custom - Designed Pre-Fabricated Walk in Coolers/Freezers. Technoblock is an ISO 9001 & CE certified company and they have received international recognition for quality standards.

Premier-Technoblock units can be used to maintain temperature of +5°C to (-) 50°C It is one of the largest companies in the world & they market their products globally in more than 160 countries and they make more then 40,000 units annually.

Refrigeration units include:

- Variety of installations
- A wide choice of models for each series
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- Care in manufacturing & testing
- Particular attention to the development of new techniques, to the employment of new materials and to the European standards.

Features: ★ Wall mounting/Ceiling Mounting & Split System ★ Hermetic or semihermetic compressor ★ Condensation by air or water ★ Electronic control on the unit or the remote control panel, defrost by air, by hot gas or by heaters.



The panels are available in Polyurethane thickness of 60 mm to 160 mm thickness with width of 500 mm to 1500 mm. The panels are of International standard density 40kg/m³. The fixing is by camlock arrangements embedded in the polyurethane. The Polyurethane is sandwiched between two sheets. The floor insulation are base panels or slabs with vapour proofing and with marine ply and aluminium chequered plate.

Premier installs and maintains an extensive range of structures from modular coldrooms and massive coldstore

RANGE OF EQUIPMENT

Adam Fabriwerk Pvt. Ltd. design and manufacture equipment for food, ayurvedic and allied industries keeping in view the technological developments in the world.

We offer complete manufacturing facility for Shrikhand with GMP (paint free construction) and CIP and SIP for batch size of 100 to 5000 kgs. The facility consists of manufacturing vessels / transfer pump / working platform / product piping / storage vessels / electrical control panel / vacuum pump / metering pump.

The salient features of our facility are: ● The plant is designed to be operated and one helper. ● Material tranfers are done by vacuum. ● Vessels are GMP (paint free construction) and are suitable for vacuum. ● Gaskets used are of silicon (food grade). ● Contact parts are of SS316 and are finished to class 4B (Mirror) finish and are crevice free. ● Entry of high shear emulsification head is from bottom through a specially designed mechanical seal and water circulation system equipment with water detection sensor. ● The high shear emulsification head is bottom mounted and acts as a pump to recirculate the products during manufacturing and discharges the product in storage vessels after the process is completed. ● Vessels are designed for 1kg /sq. cm. and 700 mm vacuum and can be sterilised. ● The storage vessels are of 500 kgs. for all sizes of plant above 500 kgs. and are mobile and can be connected to the filling machine through digital metering pump. ● Pipes, pipe fitting and valves are of SS 316, seamless, internally electropolished with DIN standard unions. ● The control panel visually shows all operations of the plant on a mimic diagram. ● Manhole of all the vessels are equipped with davit fitting and the cover of the manhole slides instead of being lifted.

For more details, contact:

Adam Fabriwerk Pvt. Ltd.

203, Rajgure Apts.,

New Nagardas Road

Andheri (W)

Mumbai-400069

Tel: 022-8380548/8384173

Fax: 022-839-0195

Email: adamfab@vsnl.com

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For further details, contact:

Premier Refrigeration Limited

1 Akurli Ind. Est.,

Akuri Road

Kandivali (E), Mumbai 400 101

Tel: 91-22-8870305 (5 Lines)

Fax: 91-22-8841275

Email: premierchiller@vsnl.com

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 CHEMICALS - FOOD GRADE * CAFFEINE & SALTS
 * CALCIUM SALTS * CITRIC * DAIRY CHEMICALS
 * DEFOAMERS * DEXTROSE * DOUGH IMPROVERS
 * DIETARY CHEMICALS * EMULSIFIERS AND STABILISERS
 * ENZYMES * ESSENTIAL OILS * EDIBLE GUM * FATTY
 ACIDS * FOOD PRESERVATIVES * HERBAL CHEMICALS
 * LACTIC * MONO SODIUM GLUTAMATE * MANITOL
 * POTASSIUM BROMATE/SORBATE/CHLORIDE * PROPIONIC
 * PROPYLENEGLYCOL * SACHARIN * SOD. BENZOATE/
 CITRATE * STARCH * SORBIC * VITAMINS-B1, B2, B6, B12,
 VITA, VIT.C, VIT.D, VIT.E * ZINC SULPHATE HEPTA/
 MONOHYDRATE ETC.

Contact :

M/S. UMA BROTHERS

C-110, Bhaveshwara Plaza, 189, L.B.S. Marg,
 Ghatkopar (West), Mumbai - 400 086 (INDIA).

Tel: 500 4579-5004510. Fax: 091-22-5000015.

Email: umabroth@bom5.vsnl.net.in

Lidding Foils

Protect your product and consumers with our high
 quality printed aluminium lidding foils.



Our Range includes
 various suitable foils
 for HDPE, Pet, HIPS
 containers to pack
 Edible Oils, Ghee,
 Shrikhand, Tea,
 Spices, Glucose,
 etc.

We also offer
 hologram foils
 and portable foil
 sealers.

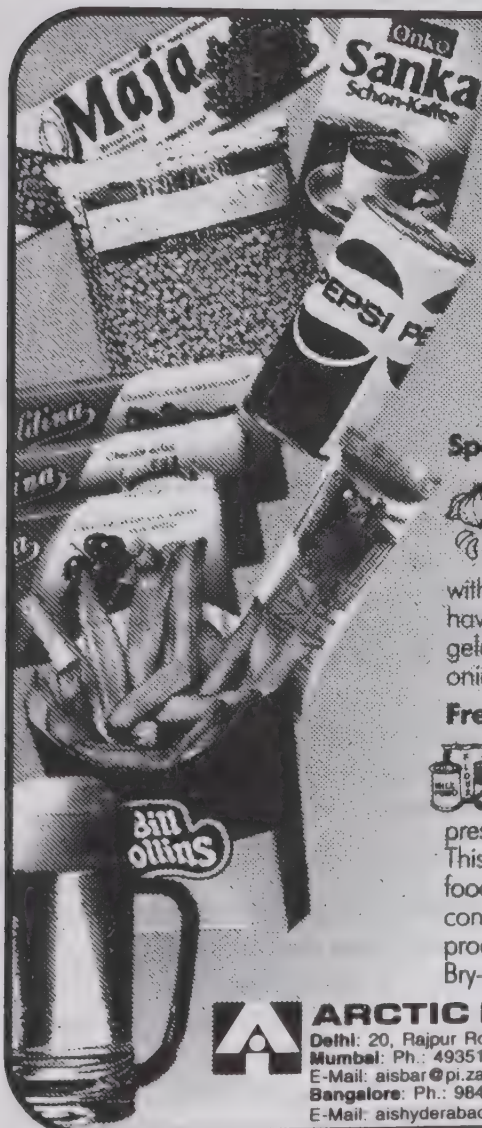
Contact us, we
 shall offer you the
 best deal.

Eskay Flexible Packaging Industries Pvt. Ltd.

11, 212, Daulat Udyog Bhavan, Wadhavli Village Road, Chembur, Mumbai 400074.

Tel. : 5580996 Telefax : 91-22- 5500125

E-mail : eskay_15@vsnl.com, eskayflex@yahoo.com



FOOD

**DRYING
 PROCESSING
 PACKAGING
 STORAGE**

HUMIDITY CAN MAKE A MEAL OF YOUR PRODUCTS

Bry-Air

DEHUMIDIFIERS

offer the simplest, most economical method of drying / humidity control

Speedier drying at low temperatures

Bry-Air Dehumidifiers speed up drying by continuously
 removing moisture from the surrounding air by a
 process of physical adsorption. Temperature sensitive
 products can thus be dried at low temperatures
 without the risk of product spoilage. Bry-Air Dehumidifiers
 have been successfully employed in the drying of cocoa,
 gelatine, yeast, instant coffee powder, sugar, flour, starch,
 onions, cardamom, katha, etc.

Free flow of powdery foods

In processing powdery foods such as cocoa, gelatine,
 dehydrated soft drink concentrates, instant coffee
 powder, milk powder, sugar, flour, starch, etc., the
 presence of moisture in the air can cause lumping or caking.
 This affects the free and easy movement of the beverage and
 food powders in the processing machines and pneumatic
 conveyors. The solution to this problem lies in surrounding the
 processing and manufacturing areas with dry air using
 Bry-Air Dehumidifiers.

Prevent organic corrosion in breweries and distilleries

Controlled temperature and humidity are
 necessary in the brewing process. Low RH
 prevents mold and mildew formation in hop
 storage, yeast rooms as well as in fermentation,
 storage and keging areas.

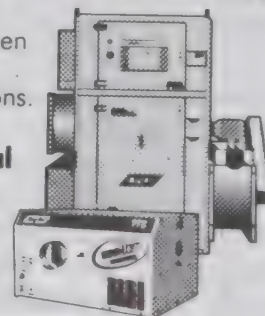


Keep them crisp and fresh

Biscuits, snacks, wafers, corn chips, powdery
 foods, soft drink concentrates as well as freeze
 dried food tend to regain moisture unless
 relative humidity is effectively controlled during
 packaging and storage.

Bry-Air Dehumidifiers have been
 successfully employed in
 maintaining the ideal conditions.

**Bry-Air custom designs
 systems to your individual
 needs.**



ARCTIC INDIA SALES

Delhi: 20, Rajpur Road, Delhi 110054. Ph.: 3912800. Fax: (011) 2947075. E-Mail: aisdeldhi@pahwa.com
 Mumbai: Ph.: 4935155. Fax: (022) 4931020. E-Mail: aisdombay@pahwa.com • Baroda: Ph.: 351493. Fax: (0265) 342080
 E-Mail: aisdar@pi.zaverchand.co.in • Kolkata: Ph.: 2472541. Fax: (033) 2478450. E-Mail: aiscalcutta@pahwa.com
 Bangalore: Ph.: 9845076054. E-Mail: aisdangalore@pahwa.com • Hyderabad: Ph.: 7154243. Fax: (040) 7174059
 E-Mail: aishyderabad@pahwa.com • Chennai: Ph.: 6287231. Fax: (044) 6203829. Website: www.bryair.com

A PASWA ENTERPRISE

NEW MODEL 1600 ROLL-FED LABELER



The BH1600 is an economical new roll-fed labeller designed specifically for packaging operations with moderate production capacity requirements. It handles a wide range of container and label sizes and features B&H Rapid change over (RCO) capability to maximize production flexibility while minimizing production line downtime.

BH1600 maximizes productivity by allowing container size and label changeover, to be performed by one employee in 15 to 20 minutes with no tools required. Quick release handles, minimal change parts, and fewer required adjustments result in greater operational simplicity.

The BH160 offers superior container

handling and label control to ensure labelling accuracy. The patented Computerized Registration System (CRS) automatically maintains optimum registration, adjusting to variations in label length. The CRS uses an advanced photo-eye sensor that monitors the registration marks on the film and automatically adjusts the label feed to ensure the label are correctly cut every time.

B&H designed the BH1600 to accommodate a variety of container types and accurately handle a wide array of label substrates, such as polypropylene, PVC, and clear polystyrene with variable machinability.

For further details, contact:

B&H Labelling Systems

P.B. Box: 247, Ceres

CA 95307 USA

Tel: 209 537 5785

Fax: 209 537 6854

Email: marketing@bhlabeling.com

Website: <http://www.bhlabeling.com>

THERMAL SHOCK CHAMBER



Thermal Shock Chamber is manufac-

tured by C.M. Equipment and Instruments. The chamber is internally made from SS304 and externally from CRCS with electrostatic powder coating. Air flow is maintained in individual chambers between 2 to 3 mtr/sec. The carrier movement is carried out by specially designed pneumatic cylinders with suitable controls.

A suitable Racold make air heaters are provided. It consists of single stage/two stage cascade refrigeration system with air cooled condenser and frost free evaporation. Microprocessor digital temperature indicator and controller is provided to control temperature in individual chambers. Individual chambers are having illuminated double wall door and viewing window.

For further details, contact:

C.M. Equipment & Instruments (I) Pvt. Ltd.

B-199, PB No. 5847

5th Main, Peenya II Stage

Bangalore 560 058

Tel: 8360361, 8360711

Fax: 080-8360343

Website: <http://www.cmeipl.com>

Email: cmeipl@vsnl.com

LIDDING FOILS

Eskay Flexible Packaging Industries manufacture high quality printed aluminium lidding foils. Their range of products include various foils for HDPE, PET, HIPS containers, for packing of edible oils, ghee, shrikhand, tea, spices, glucose, etc.

The company also offers hologram foils and portable foil sealers.

For your requirements, contact:

Eskay Flexible Packaging Industries Pvt. Ltd.

11, 212, Daulat Udyog Bhavan
Wadhavli Village Rd.

Chembur

Mumbai 400 074

Tel: 5580996

Fax: 91-22-5500125

Email: eskay_15@vsnl.co

eskayflex@yahoo.com

COOLING TOWERS

Blue Chip Cooling Towers are manufacturers of FRP/Timber/Induced/Nat Towers with capacity ranging from 5 to 600 TR. These cooling towers find application in A.C. refrigeration plant, D.G. Sets, Plastic Machines and Process Cooling.

The company's speciality lies in re-vamping and repairing of Timber Towers. They also stock spare parts of a number of other makes.

For further details, contact:

Blue Chip Cooling Towers Pvt. Ltd.

123, Sonal Link Industrial Estate No.2

Kanchpada, Link Road

Malad (W)

Mumbai 400 064

Tel: 880 5089

Telefax: 8805164

PACKAGING MACHINES

Indvac range of machines are manufactured by Saurabh Engineers. Some of their products include Vacuum Packaging machines which are available in table top, nitrogen flushing machines for pillow packing of potato wafer in pouches, Shrink wrapping machines in conveyorised Tunnel type models, are their other products.

Impulse/Hotbar Sealers, Special Purpose Long Sealers, Continuous Sealers and Vertical Sealers are also

manufactured by Saurabh Engineers.

For further details, contact:

Saurabh Engineers

11, Upvan Co. Op. Hsg. Soc. Ltd.

Off. 132 Ft Ring Road

Ahmedabad 400 051

Tel: (O & R) 6765115, 6760292

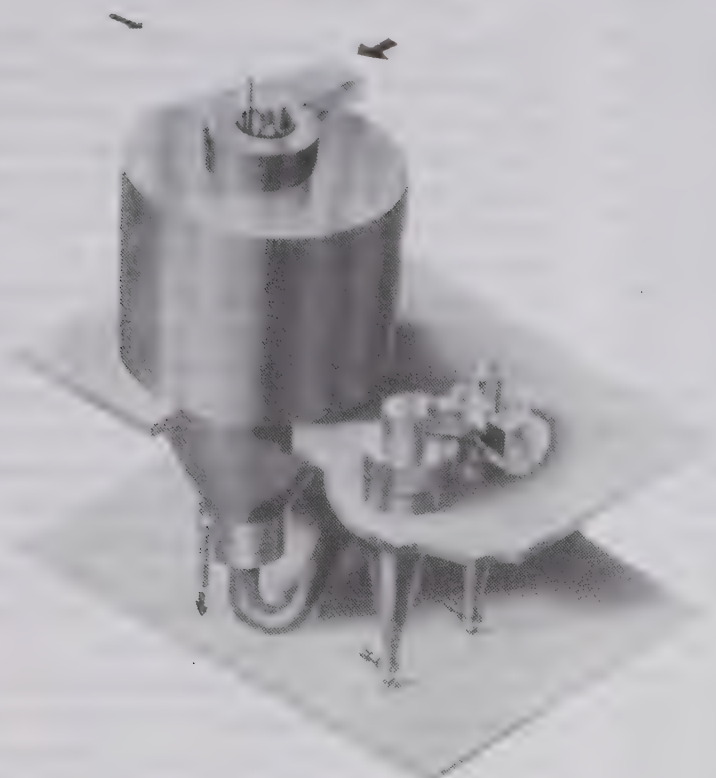
(Fact.) 2740288, 2732428

Fax: 91-79-6765115/2740288

Email: indvac@ad1.vsnl.net.in

Website: www.indvac.com

SPRAY DRYER



M.K. Manufacturing Co. are engineers and process designers of Fluid Bed/Spray Dryers, Salt upgrading plant, Rotary Atomizer, Rotary Air Lock, Crusher, Sieving machines, Conveying

systems and Process Equipment, Spray Drying Plants are often thermally inefficient but have been used in industry for they have advantage of producing powder in one sketch with uniform product of good quality.

Spray Drying is the transformation of feed from a fluid state into a dried particulate form by spraying into a hot drying medium.

Spray drying system consists of four process stages.

- Atomization system consists of four process stages
- Atomization of feed into a spray
- Spray - Air contact
- Drying of spray
- Separation of dried product from the air.

For more details, contact:

M K Manufacturing Company

Bhatia Glass Compound

Vakola Pipeline

Santacruz (E), Mumbai - 400 055

Tel: 6100219 / 6130388

Fax: 6187365

PANCAKE — THE STATE OF THE ART LEVEL-BY-WEIGHT TECHNOLOGY

Global Weighting India Limited (GWT) has launched "Pancake" - the state of the art level-by-weight technology for the process industry. Along with this GWT has also introduced the "Star Range" of weighbridge PR6221 load cells. These initiatives will help Global weighting further enhance its technical leadership in the industrial weighting solution market.

The "Pancake" is a revolutionary method of level measurement. It has been specially designed for level control applications in food & beverages, chemical and other process industries. The pancake indicates the true content in tanks and vessels irrespective of size and shape without complicated mechanics.

A result of the tremendous R&D efforts at Global Weighting, the "Pancake" — level-by-weight technology has unique features that are not present in any of the methods available till date.

The "Star Range" of weighbridge PR6221 load cells with extremely high accuracy of 0.01% was also launched. These load cells form the heart of a precise and accurate weighbridge at the time of entry and exit at the factory facilitating wagon/truck weighing. These are manufactured using the advanced 3-micron technology, which is the key behind its accuracy enabling small

changes in load to be registered. These load cells can operate under temperatures as high as 95° Celsius and do not need the user to calibrate the weighbridge frequently.

The "Pancake" and the "Star Range" of load cells have already been successfully test marketed and GWT is expecting additional sales of half a crore each from "Pancakes" and "Star Range" weighbridge PR6221 load cell.

Global Weighing is part of Sartorius Group, one of the largest weighing businesses worldwide. Sartorius Group, headquartered in Germany is an international leading supplier of weighing and separation products. The group is represented in nearly 150 countries.

Global Weighting India (formerly Philips India's Weighing Business Unit) has been a leading industrial weighing company in India and has earned the trust of a large number of companies in segments like Food & Beverages, Iron & Steel, Cement, Glass, Oil & Gas, Chemicals & Petrochemicals, Lubricants, Pharmaceuticals, Personal Care Products etc.

For further information, contact:

Global Weighing India Pvt. Ltd.

"Delphi", Plot No. 17/2

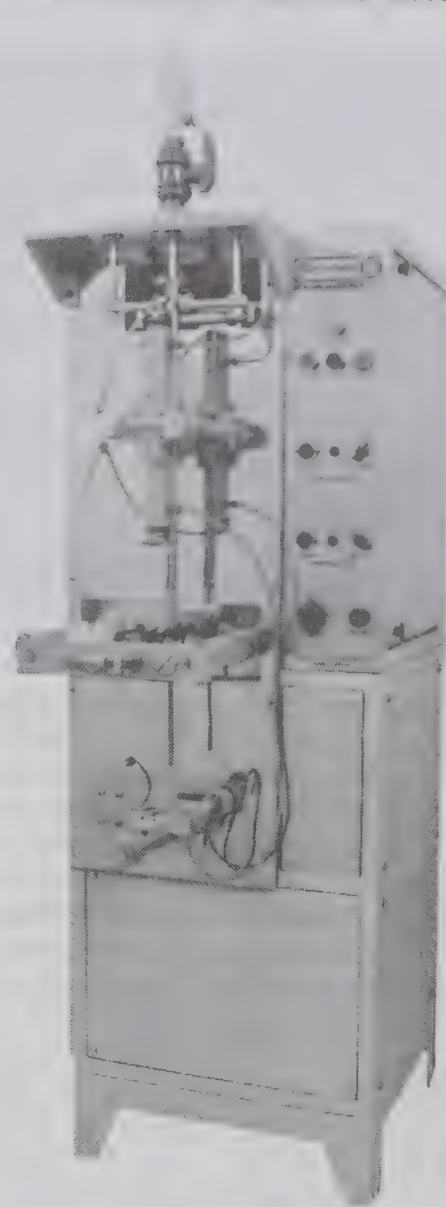
Erandavane, Karve Road

Pune 411 004

Tel: 020-5410681/2

Fax: 020-5410688

JUICE / LIQUID PACKING MACHINE



Lucas Electronics manufactures juice/liquid packing machines, in particular the Master Seal Liquid Filling LE-F.F.S-200 Series vertical Packaging Machine.

This machine automatically forms a bag, fills it, then seals and separates the finished packets. The LE-F.F.S- 200 is suitable for all kinds of low density liquids like Juice, Oil, Milk, Mineral Water and any type of free flowing liquids. The Master Seal Vertical form fill and seal machine (F.F.S.) is robust with particular consideration for minimum maintenance, easy to adjust and high reliable output. All contact parts are manufactured by stainless steel. This machine constructed with unique features, is easy to operate for the customers.

Other products manufactured by them are • Liquid/Cream Filling • Shrink Wrapping • Gas Flushing • Continuous Band Sealer • Motorized Pepsi Sealer & Cap Sealer

For further details, contact:

Lucas Electronics

B2/5, Mapkhan Nagar

Near Brigade, Marol Naka

Andheri (E), Mumbai 400 059

Tel: 8213660

Telefax: 8254978

Email: lucasg@bom2.vsnl.net.in

HIGH PRESSURE CRATE WASHER



Goma high pressure crate washer has been successfully working in various industries. The crates/trays are washed thoroughly by high pressure water jet only. There is no requirement of steam, detergent, chemicals etc. The machine is more compact and with minimum maintenance.

The crates/trays are conveyed automatically by conveyor chain fitted on stainless steel fabricated frame. The crates/trays pass through high pressure water jet nozzles having accurate spray angle for washing. The high pressure is generated by a high pressure pump driven through electric motor and mounted close to conveyor. The speed of conveyor is variable and can be adjusted to get optimum wash-

ing effect. The washing process is being made inside the stainless steel fabricated enclosure which prevents all egress of water. The enclosure has a provision for easily openable doors for maintenance purposes. Waste water is collected in a sump which can be connected either to the sewage system or can be reused passing through the special filtration system. The whole machine is provided with adjustable feet for levelling and needs no fixing to the floor. A separate

electrical control panel is being provided.

Advantages: • Fully automatic • Ensures optimum cleaning in the fastest possible time • Compact design for space saving • Time and man power saving • No need of steam, chemicals, detergents etc. • Low power consumption • Easy for operating and maintenance

For further details, contact:

Goma Engineering Pvt. Ltd.
Behind Universal Petrol Pump
Majiwada, Thana - 400602
Tel: 91-22 5340875/1438
Fax: 91-22 533 3634/2
Email: goma@bom3.vsnl.net.in
Website: www.gomaengg.com

ULTRAVIOLET WATER DISINFECTION SYSTEM

Ultraviolet Water Disinfection System using the latest US based Teflon® Technology is the ultimate answer to prevent pollution and contamination in water. Non-fouling Teflon® Tubes UV units for water and waste water treatment are used to overcome scale problems.

These units find application in disinfection of drinking/process water, pre-treatment before R.O., algae and slime control, purer fermentation products. The system can also be used for various industrial applications such as supply of high purity water for beverage, bottling, brewing pharmaceuticals, food processing etc. It achieves near cent percent water purity without any side effects. It is also cost effective and maintenance free.

Among the products offered are various models of water disinfection systems, ranging from 225 LPH to 12 Lac LPH of UV systems, micron filters, carbon filters, air irradiators etc.

For further details, contact:

Hitech Ultraviolet Pvt. Ltd.
P.O. Box. No. 8356
35, Grace Plaza
S.V. Road, Jogeshwari (W)
Mumbai 400 102
Tel: 6790610, 6794611, 6794327
Fax: 6794337
Email: hitechuv@bom5.vsnl.net.in

OZONE GENERATORS



Indizone is the first and only Indian made Ozone Generator that has been exported. Together with time tested technically superior equipment, Indizone comes with a backing of successful application methods that ensure results. The company's service back up is excellent. Indizone is available in various models to suit client's applications.

For further details, contact:

Ozone Technologies & Systems India Pvt. Limited
1-A, 12th Cross Street
Shastri Nagar
Chennai 600 020
Tel: 446 0443
Telefax: 491 4133
Email: otsil@vsnl.com
Website: www.otsil.indiaa.com

FRUIT PROCESSING MACHINERIES

Since 30 years M/s. Techno-Equipments has been manufacturing and supplying high quality Fruit Processing Machinery to leading Fruit Processors.

The high quality of the machine as per the specification given is due to the expertise and dedication of Food Technology/Engineering in this field.

All machines are designed and fabricated under the supervision of Senior Technologists and experienced engineers, by maintaining strict quality control from procurement of raw material to the final assembly under going rigid tests before it leaves the factory.

Techno-Equipments is manufacturing machines like Exhaust-box, Retorts, Steam jackets kettles with/without anchor type stirrers, Fruit Pulpers, Fruit Mills, Juice Extractors, Vacuum Bottle Fillers/Washers, Pineapple-slicers and Papaya Cubers with s.s. Tanks.

For more details, contact:

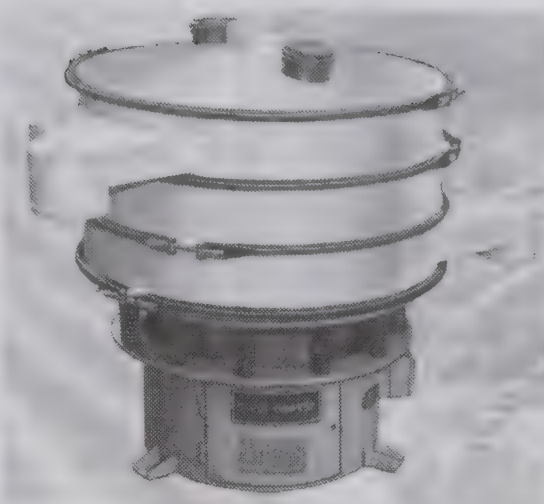
Techno-Equipments
9, Satyam Industrial Estate
Behind USV Ltd.,
Off. B.K. Devashi Marg
Govandi, Mumbai 400 088
Tel: 5515640

VIBRO SIFTERS

Magumps, already a well reputed and known name in the field of pharmaceutical bulk drug process industries for high quality equipment and plants introduces 'Vibro Sifters' useful in dry separation, dry classification, straining, sieving, gradation, solid liquid separation, solid classification etc. This can be used in pharmaceuticals, grains, fertilizers, animal feeds, abrasives, pulp and paper, foods, ceramics, minerals, water disposal, chemical and petro chemicals.

The vibro sifters are manufactured with all the product contact parts in S.S. (304/316/316L quality), and is available from 12" dia to 72" dia. The sieves used, have been newly designed, simple type with soldered rim similar to mechanical sifter for ease of quick change over. These sifters are simple in construction, simple to use and maintain. They have no rubber parts and hence require minimum maintenance, 20 to 30% extra output than mechanical sifter, modular design i.e. additional decks can be added at any time very quickly, intensity of vibration can be changed by adjusting eccentric weight.

They can also be supplied with dust



cover, complete S.S. covered body as per GMP. Over 30 units have already been sold for domestic as well as export market.

For further details contact :

Magumps

Trisandhya 'A'
97, D. Phalke Road
Dadar (East)
Mumbai - 400 014.
Tel: 411 3572, 415 4474
Fax: 022-413 7648 / 8307
E-mail: magumps@bom5.vsnl.net.in.

PIPES/VALVES/FITTINGS

Paul Air Engineers Pvt. Ltd. are well known manufacturers of SS Electropolish Pipe, Bends, Tees, Unions, Reducers, Valves, Filters and Pumps.

The Valves include Plug, Butterfly, Ball, Bunging device, etc. while their Fitting includes unions, bends, tees, flanges, blanks among others. These find application in the dairy, beverages, breweries, chemicals, cosmetics, mineral water, soft drinks, food, icecream and pharmaceutical industries.

Pumps such as centrifugal and monoblock IHP-3HP & diesel are manufactured by them and strainers include Y,T, Conical and Inline Filters.

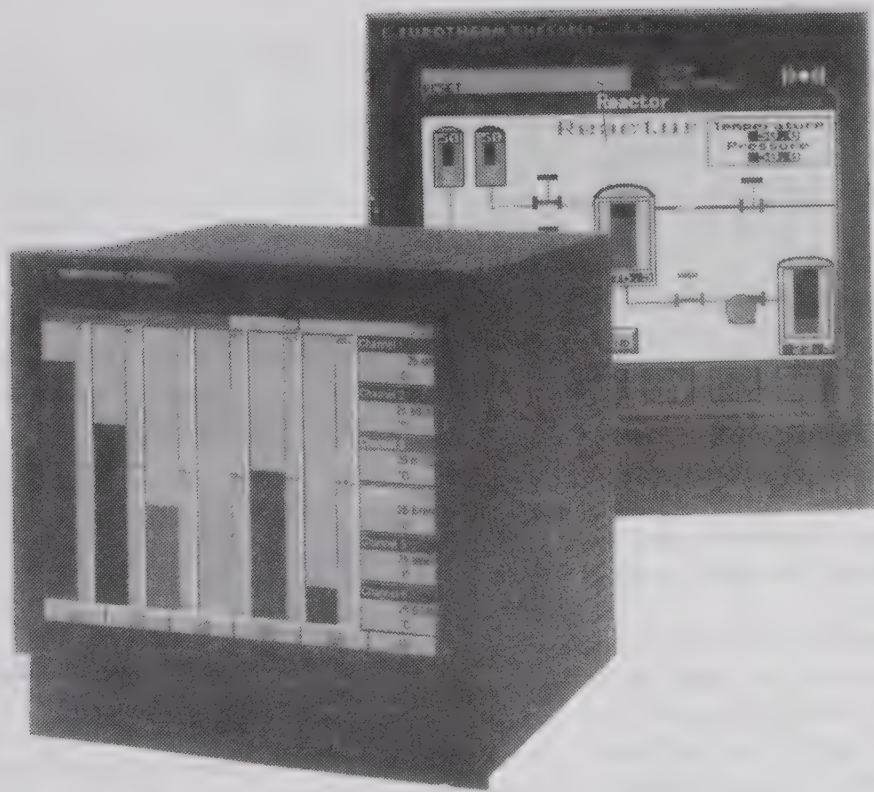
They also undertake electropolish and erection of SS Product Pipeline. All their products are manufactured as per FDA GMP and Sanitary standards.

For further details, contact:

Paul Air Engineers

B-26, Nand Jyot Industrial Estate
Safeed Pool, Mumbai 400 072
Tel: 8516401
Fax: 8514525
Email: paulair@vsnl.com

DAQ SERIES 5000 RECORDERS



Eurotherm DEL India Limited is a joint venture between Dalal Group and Invensys plc., UK, one of the world's leading automation and controls companies.

recorder, the **DAQ Series 5000**, will meet a wide range of data recording functions across many industries and use leading-edge 32 bit RISC processor technology to

Eurotherm manufactures a wide range of control, monitoring and data recording systems and products. The company's offerings include Variable Speed Drives and Related Power Control products, Temperature and process controllers and Indicators, Data Recorders and Acquisition Systems, Process Automation Systems, and Film Sheet and Coating Measurement & Control Systems.

Eurotherm's new family of graphical

significantly reduce component count. The instrument also features high-quality I/O, multi-function touch-sensitive screens and the ability to be networked, enabling archiving of data into plant-wide data networks. The 5100V (5.5" display) and 5180V (12.1" display) models directly replace standard 100 mm and 180 mm panel-mounted chart recorders and allow plant and equipment upgrades to be implemented with minimal re-design. The 5100V offers up to 12 input channels, while the 5180V offers up to 36. Inputs may be dc V, dc mV, dc mA, TCs, RTD, or contact closure. Sample rate is 125 ms standard.

Salient features: • 6 to 36 Channels • TCP/IP Connectivity • Web Browsing • Touch Screen • Wide Screen (12.1") SVGA • Universal Input • Huge Internal Memory 19MB Input Scan rate of 125ms • Custom Screen • Auto backup of Data.

For more details, contact:

Eurotherm DEL India Limited

152, Developed Plots Estate
Perungudi, Chennai 600 096
Tel: +91 44 4961129
Fax: +91 44 4961831
Email: info@eurothermdel.com
Website: www.eurothermdel.com

*When Replying to Ads
Please Mention*
BEVERAGE & FOOD WORLD

WATER CHILLER



Mellcon Engg. Pvt. Ltd. has introduced a state of Art "SKID MOUNTED WATER CHILLER" for cooling from .5 Tr to 40 TR capacity. The system is compact in design and is provided with a Digital temperature controller. The chillers are complete with pump & stainless steel tank with Coil Chiller fully insulated. The tank system has a distinct advantage over shell & tube chiller in terms of breakage of coil due to ice formation, coil is repairable at site, initial cost is

*Paper converting & coating chill Rolls
*Plating & Anodising *Milk/Dairy & Food Products
*Lubricants/Oil Cooling *Moisture condensation.

For further details, contact:

Mellcon Engineers Pvt. Ltd.
B-297, Okhla Indl. Area
Phase-I
New Delhi - 110 020
Fax: 91-11-6816573

STACKED RING FILTERS

Kumar Process Consultants are manufacturers of stacked Ring Filters, ideally suited for clarification of Sugar Syrup, Honey, Wine, Beer, Fruit Juices and Pharmaceutical products.

Filter is made of a shell fitted with filter elements formed by stacking of specially designed rings on a machined rod to form a cylindrical porous structure which is rigid having a flow volute on the internals. These elements are coated with filtered to form a sturdy and porous filter bed. The fluid which is to be filtered is passed through this and the filtered fluid is taken to collection tank or for down stream processing.

The stacked filter ring is compact, requiring no consumable spares. It is made of SS316 and Sealing gaskets in Silicon, PTFE and viton to with stand hot water sanitization or stream sterilization. Unit does not need to be dismantled for cleaning.

For more details, contact:

**Kumar Process Consultants
& Chemicals Pvt. Ltd.**

230/4, Ashoka House,
Behind Hotel Sheetal Arch
Linking Road, Bandra (W)
Mumbai 400 050
Telefax: 6451964, 6420637, 6432512
Email: kumarfil@vsnl.com

REFRIGERATOR/COOLERS

Western Refrigeration, a trusted name for keeping things cool, when heat is on. The company has perfected the science and art of refrigeration for over 28 years. Western Refrigeration has a complete range of world class refrigeration solutions for soft drinks, dairy products, fresh vegetables, meat and processed foods.

Their visicoolers, chest coolers, water coolers, deep freezers and dispensers are completely CFC-free, optimised for use in tropical climates and finished with high degree UV resistant powder coated paint.

Western Refrigeration has 33 fully equipped service centres all over India and they are manned by highly qualified industry experts who give most efficient after sales services. The company's business associates include Lancer International USA and Sweden International Singapore.

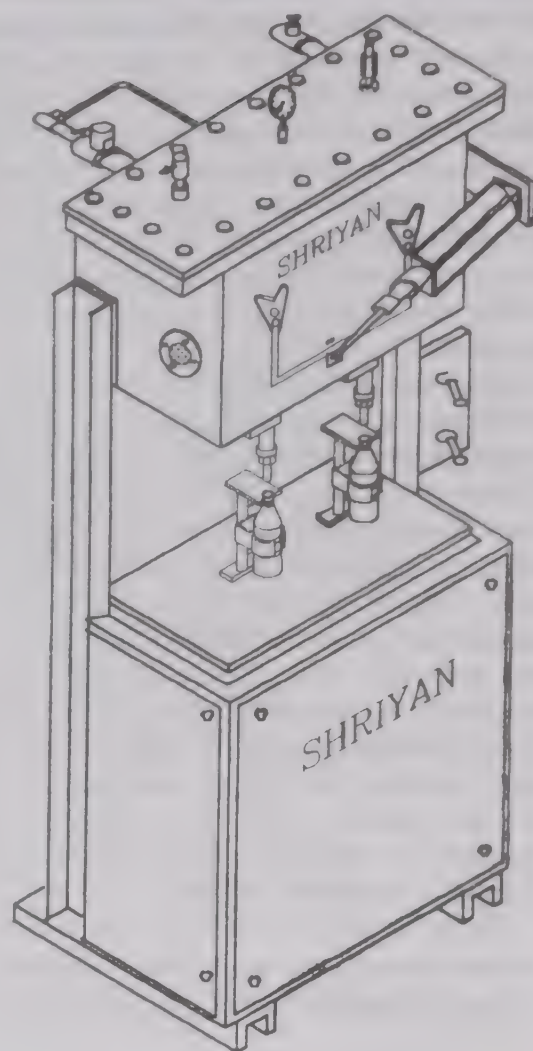
For further details, contact:

Western Refrigeration Ltd.
7/B, Pannalal Silk Mills Compound
78 LBS Marg
Bhandup (W)
Mumbai 400 078
Tel: 022-5622140/5622241/5616665
Fax: 022-5622257
Email: western@bom5.vsnl.net.in

less & space requirement shall be less. The system is fully closed loop with almost negligible wastage of water at low running cost.

Application across industries: *Chemical/ Pharmaceutical process * Plastic Processing like Injection/blow Molding *Extruders *Lamination *PP Film *Rigid PVC Pipes etc., Calenders (Plastic & Rubber)

COUNTER PRESSURE (SEMI) FILLING MACHINE



Shriyan Enterprises are manufacturers of carbonated and non-carbonated packing machinery. They also manufacture counter pressure (semi) filling machines which are used for filling soda/soft drink in pet/glass bottle in various size from 250ml to 2500ml.

For more details, contact:

Shriyan Enterprises
B/5, Gr. Flr
Ghanshyam Industries Estate
Veera Desai Road
Andheri (W)
Mumbai 400 053
Telefax: 6368320/28
Tel: 6369057/6368328
Email: shriflow@vsnl.com

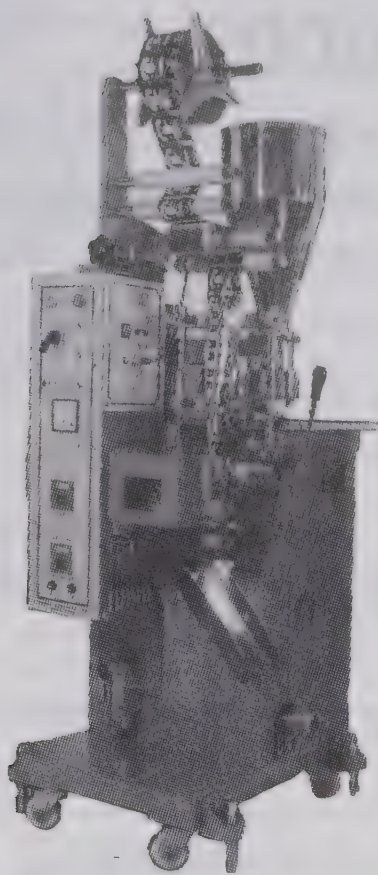
COLD CHAIN SYSTEMS

FreezeKing Industries Pvt. Ltd. are the manufacturers of most modern cold chain systems for Ice-cream, Frozen foods, Dairy Produce, Fruits, Vegetables, Pharmaceuticals and other perishables. Their cold chain systems have set high standard in India.

For further details, contact:

FreezeKing Industries Pvt. Ltd.
7/17, Kirti Nagar Industrial Area
New Delhi 110015
Tel: 5930681/85, 5157729
Fax: 011-5447509, 5413119
Email: freezeeking@vsnl.com

FORM-FILL-SEAL MACHINE



The fully automatic vertical form-fill-seal machine from Gurdeep Packaging finds application for packing any free flowing powder and granules, spices, soup-concentrates, soft drink concentrates, pharmaceutical powder, detergents, tea/coffee, pan masala, supari, confectioneries etc.

Specifications:

Sealing Type: 3 sides sealing/4 sides sealing. Packing Size: 50-120mm, or 100-240mm (film length). 20-160 mm, or 20-220 mm (film width). (enlarged type can be made upon order). Speed: 45-90 bags/min, 60-120 bags/min. (Depending on flowing rate and volume on packing objects). Packing Material: All heat sealable laminate PET/POLY, PET/FOIL/POLYMET, PET/POLY/CPP/OPP etc...

For your requirements, contact:

Gurdeep Packaging Machines

Harichand Compound,
L.B.S. Marg,
Vikhroli

Mumbai 400 079.

Tel: 5783521, 5772846, 5795982

Fax: 91-22-5772846

FOOD PROCESSING MACHINERY

Bombay Industrial Engineers is a reputed company for manufacture of various food processing machinery like Pulpers, Juice Extractors, Steam Jacketed Kettle, Fruit Slicers/Crushers, Mango Cutters and Canning retorts, Hot/Cold Liquid Slicing Lines, Bottle Closing Powder Filling and Form Fill Sealing Machines.

They also manufacture Dryers, Tray, Tunnel Drum and Fluid Bed. The company manufactures Biscuit Bread making Machine, Toffee Hard Boiled Sweet Machine, Chewing Gum making Machine, Boilers, Themopack, Sigma Kneaders, High Speed Mixers, Planetary Mixers and Powder Mixers, Weighing machines.

For further details, contact:

Bombay Industrial Engineers

13, Crystal Apartment

Gulmohar Cross Road

11, J.V.P.D Bombay 400 049

Tel: 6232810

Telefax: 6201914

Email: ijsehgal@bom5.vsnl.net.in

CANNING MACHINES

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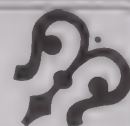
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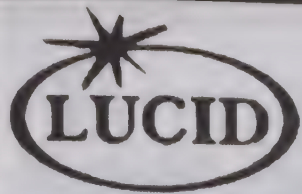
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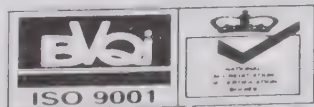
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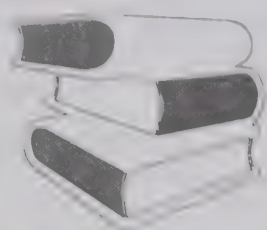
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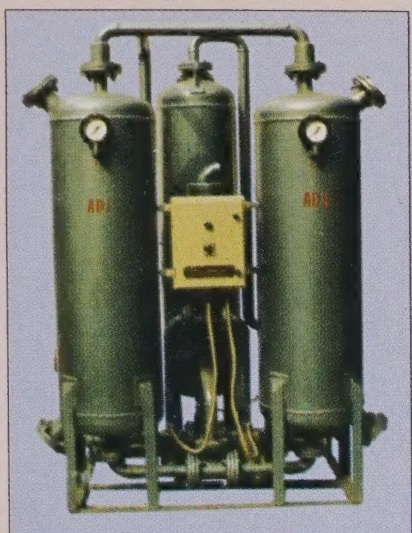
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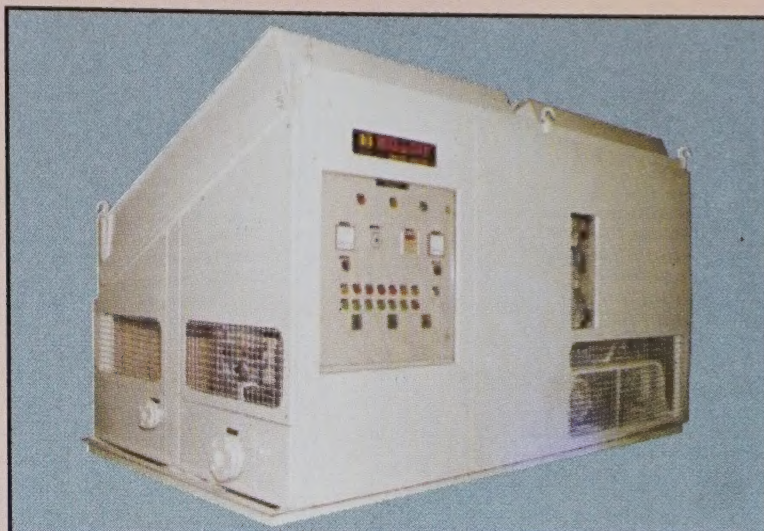
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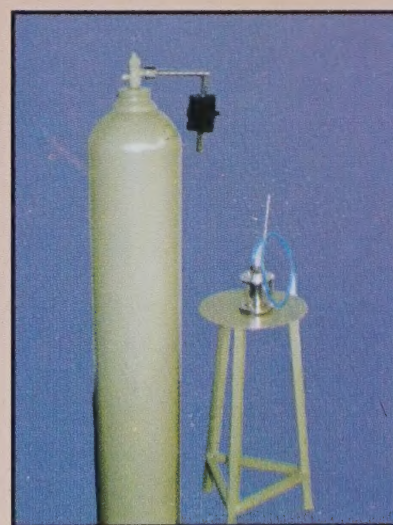
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